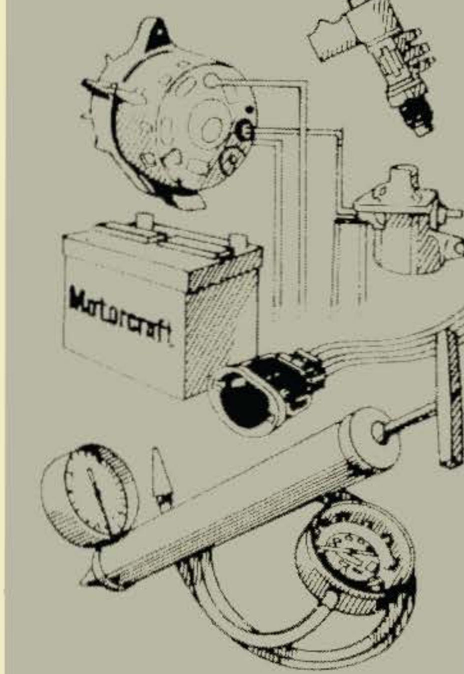
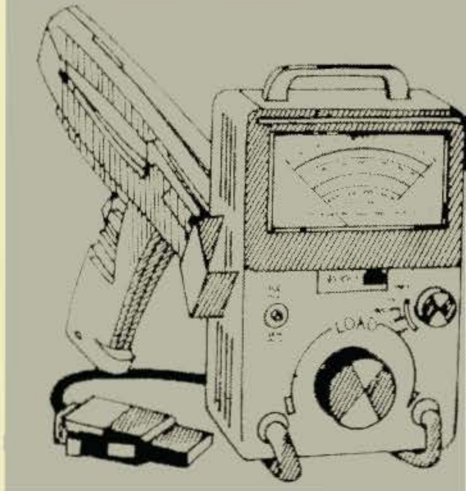
1987 BRONCO/F150/350

1987 BRONCO/ F150 / 350



Electrical & Vacuum Trouble-Shooting Manual



1987 BRONCO, F150-F350

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IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles, as well as the personal safety of the individual doing the work. This Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that he compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

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The purpose of this manual is to show electrical and vacuum circuits of these vehicles in a clear and simple fashion to make troubleshooting easier. With each circuit is a description of *How the Circuit Works* and some *Troubleshooting Hints.* A *Component Location* chart lists components, connectors, and grounds in that circuit. The chart includes a description of where each item is located, and references to pictures in the manual.

Wiring Diagrams give a schematic picture of when and how the circuit is powered, what the current path is to circuit components, and how the circuit is grounded. Each circuit component is named (underlined titles). Wire and connector colors are listed (standard Ford color abbreviations are used):

COLOR ABBREVIATIONS

BL	**Blue**	**N**	**Natural**
BK	**Black**	**O**	**Orange**
BR	**Brown**	**PK**	**Pink**
DB	**Dark Blue**	**P**	**Purple**
DG	**Dark Green**	**R**	**Red**
GR	**Green**	**T**	**Tan**
GY	**Gray**	**W**	**White**
LB	**Light Blue**	**Y**	**Yellow**
LG	**Light Green**		

Where two colors are shown for a wire, the first color is the basic color of the wire. The second color is the stripe marking. It should be noted that the use of dots and hashes for circuit identification has been eliminated. Dots may still be encountered as an additional identification where the wire harness manufacturer has encountered multiple wires with the same identification colors (solid or stripe) in a connector and requested a deviation.

Connector end views of switches and other components are shown to help with bench testing. The views show the harness wire colors that connect to the mating terminals. Connector colors and locations are shown in the *Component Location* chart. Two-color listings indicate separate colors for each connector half.

Components which work together are shown together. For example, all electrical components used in any circuit are shown on one diagram. The circuit breaker or fuse is shown at the top of the page. All wires, connectors, splices, switches, and motors are shown in the flow of current to ground at the bottom of the page. Notes are included which describe how switches and other components work. If a component is used in several different circuits, it is shown in several places. For example, the **Main Light Switch** is an electrical part of many circuits, and is repeated on many pages. In some cases, however, a component may seem, by its name, to belong on a page where it has no electrical connection. For example, **Radio Illumination** is electrically part of **Instrument Illumination.** Since it has no electrical connection at all with the actual **Radio** circuit, it is not shown on the **Radio** page.

Troubleshooting Hints point the technician in a general direction, but are not intended as a step-by-step procedure. Ignition troubleshooting is an exception to this. It includes a step-by-step procedure of basic quick checks to locate some of the more common **Ignition System** problems. Read the Shop Manual for more detailed repair procedures.

The **Grounds** pages show detailed views of multiple component ground points. This is useful for checking interconnections among the ground circuits of different diagrams.

Notes, Cautions, and **Warnings** appear in boxes on text pages and contain important **vehicle and mechanic safety information.**

Notes give added information to help complete a particular procedure. Cautions are included to prevent making an error that could damage the vehicle. Warnings highlight areas where carelessness can cause personal injury. The following list contains some general **Warnings** that should be followed when working on a vehicle.

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires being under a vehicle.
- Be sure that the **Ignition Switch** is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on any vehicle. An automatic transmission should be in PARK. A manual transmission should be in NEUTRAL.
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide.
- Keep away from moving parts when the engine is running, especially the fan and belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter, and muffler.
- Do not allow flame or sparks near the battery. Gases are always present in and around the battery cell. An explosion could occur.
- Do not smoke.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing.

HOW TO FIND THE ELECTRICAL PROBLEM

TROUBLESHOOTING STEPS

These six steps present an orderly method of troubleshooting:

Step 1. Verify the problem.

- Operate the complete system and see all symptoms for yourself in order to:
  - —check the accuracy and completeness of the customer's complaint.
  - —learn more that might give a clue to the nature and location of the problem.

Step 2. Narrow the problem.

- Using this manual, narrow down the possible causes and locations of the problem in order to more quickly find the exact cause.
- Read the description of *How the Circuit Works* and study the wiring diagram. You should then know enough about the circuit operation to figure out where to check for this trouble.

Step 3. Test the cause.

- Use electrical test procedures to find the specific cause of the symptoms.
- *Troubleshooting Hints* will give some helpful ideas.
- The *Component Location* charts and the pictures will help you find components, grounds, and connectors.

Step 4. Verify the cause.

- Confirm the fact that you have found the correct cause through operating the parts of the circuit you think are good.

Step 5. Make the repair.

- Repair or replace the faulty component.

Step 6. Verify the repair.

- Operate the system as in Step 1 and check that your repair has removed all symptoms, and also has not caused any new symptoms.

Some engine circuits may need special test equipment and special procedures. See the *Shop Manual* and other service books for details. You will find the circuits in this manual to be helpful with these special tests.

TROUBLESHOOTING TOOLS

JUMPER WIRE

This is a test lead used to connect two points of a circuit. A **Jumper Wire** can complete a circuit by bypassing an open.

Uses: Bypassing Switches or Open Circuits

WARNING

Never use a jumper wire across loads (motors, etc.) connected between hot and ground. This direct battery short may cause injury or fire.

VOLTMETER

A DC **Voltmeter** measures circuit voltage. Connect negative (- or black) lead to ground, and positive (+ or red) lead to voltage measuring point.

OHMMETER

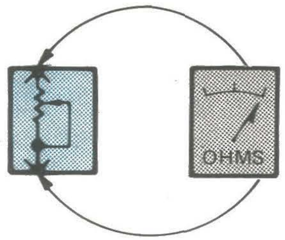


Figure 1— Resistance Check

An **Ohmmeter** shows the resistance between two connected points (Figure 1).

TEST LIGHT

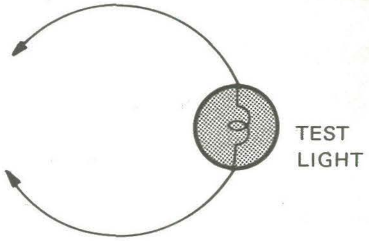


Figure 2 —Test Light

A **Test Light** is a 12-volt bulb with two test leads (Figure 2).

Uses: Voltage Check. Short Check

SELF-POWERED TEST LIGHT

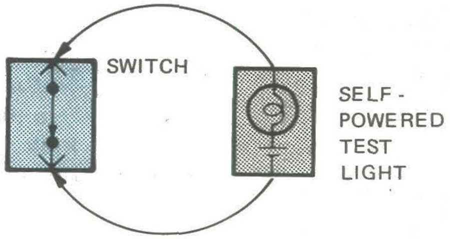


Figure 3—Continuity Check

The **Self-Powered Test Light** is a bulb, battery and set of test leads wired in series (Figure 3). When connected to two points of a continuous circuit, the bulb glows.

Uses: Continuity Check. Ground Check

CAUTION

When using a self-powered test light or ohmmeter, be sure power is off in circuit during testing. Hot circuits can cause equipment damage and false readings.

TROUBLESHOOTING CHECKS

SWITCH CIRCUIT CHECK

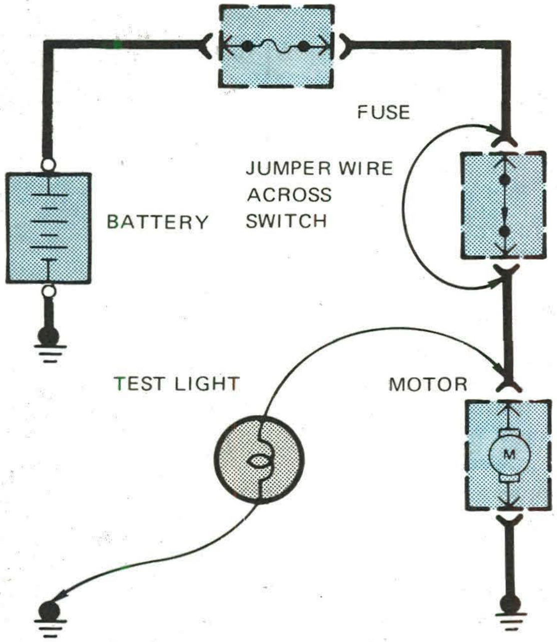


Figure 4—Switch Circuit Check and Voltage Check

In a bad circuit with a switch in series with the load, jumper the terminals of the switch to power the load. If jumping the terminals powers the circuit, the switch is bad (Figure 4).

CONTINUITY CHECK (Locating open circuits)

With power off, connect one lead of **Self-Powered Test Light** or **Ohmmeter** to each end of circuit (Figure 3). Light will glow if circuit is closed. Switches and fuses can be checked in the same way.

VOLTAGE CHECK

Connect one lead of **Test Light** to a known good ground or the negative (-) battery terminal. Test for voltage by touching the other lead to the test point. Bulb goes on when the test point has voltage (Figure 4).

SHORT CHECK (short to ground)

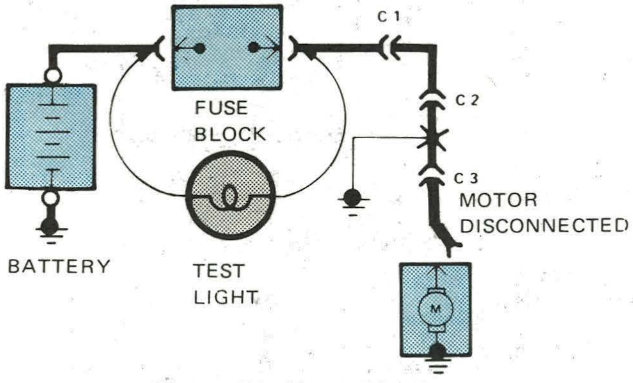


Figure 5— Short Check

A fuse that repeatedly blows is usually caused by a short to ground. It's important to be able to locate such a short quickly (Figure 5).

1) Turn off everything powered through the fuse.
2) Disconnect other loads powered through the fuse:
   - Motors: disconnect motor connector.
   - Lights: remove bulbs.
3) Turn **Ignition Switch** to RUN (if necessary) to power fuse.
4) Connect one **Test Light** lead to hot end of blown fuse. Connect other lead to ground. Bulb should glow showing power to fuse. *(This step is just a check to be sure you have power to the circuit.)*
5) Disconnect the **Test Light** lead from ground and reconnect it to the load side of the fuse.
   - If the **Test Light** is off, the short is in the disconnected equipment.
   - If the **Test Light** goes on, the short is in the wiring. You must find the short by disconnecting the circuit connectors one at a time until the **Test Light** goes out. For example: with a ground at X, the bulb goes out when C1 or C2 is disconnected, but stays on after disconnecting C3. This means the ground is between C2 and C3.

"GOOD GROUND" CHECK

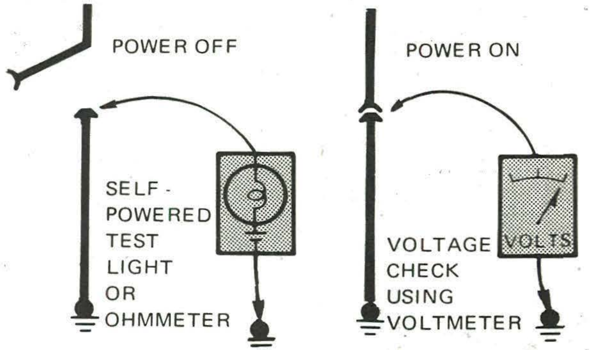

POWER OFF
POWER ON
SELF-POWERED TEST LIGHT OR OHMMETER
VOLTAGE CHECK USING VOLTMETER
VOLTS

Figure 6 – Grounds Checks

Turn on power to circuit. Perform Voltage Check between suspected bad ground and frame. Any voltage means ground is bad.

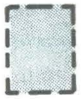
Turn off power to circuit. Connect one lead of **Self-Powered Test Light** or **Ohmmeter** to wire in question, and the other to known ground. If bulb glows, circuit ground is OK (Figure 6).

TROUBLESHOOTING HINTS

The circuit schematics in this manual are designed to make it easy to identify common points in circuits. This knowledge can help narrow the problem to a specific area. For example, if several circuits fail at the same time, check for a common power or ground connection. (See *Power Distribution* or *Grounds).* If part of a circuit fails, check the connections between the part that works and the part that doesn't work.

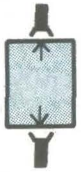
For example, if low beam headlights work but high beams and the indicator light don't work, then power and ground paths must be good. Since the dimmer switch is the component which switches this power to the high beam lights and indicator, it is most likely the cause of failure.

ELECTRICAL SYMBOLS

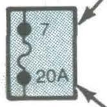


DASHED COMPONENT BOX

ONLY PART OF THE COMPONENT IS SHOWN, OR COMPONENT IS SHOWN IN TWO PLACES



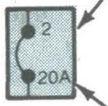
COMPONENT WITH CONNECTORS



POSITION NUMBER

FUSE

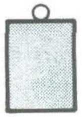
CURRENT RATING



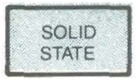
POSITION NUMBER

CIRCUIT BREAKER

CURRENT RATING

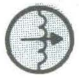


SCREW TERMINAL ON COMPONENT

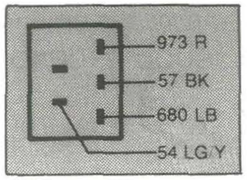


SEALED ELECTRONIC COMPONENT

ANY CIRCUITRY SHOWN INSIDE THE BOX IS A FUNCTIONAL EQUIVALENT ONLY AND IS NOT EXACT



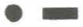
GAUGE



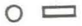
COMPONENT CONNECTOR END VIEW

SHOWS PINS OR SOCKETS ON A COMPONENT TO AID IN BENCH TESTING

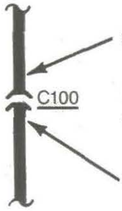
WIRE COLORS ARE LABELED FOR MATING HARNESS CONNECTOR



PIN AND BLADE TERMINAL TYPES



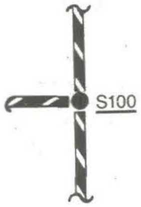
SOCKET TYPES



SOCKET

IN-LINE CONNECTOR

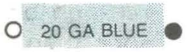
PIN



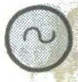
SPLICE OR CRIMP CONNECTION

MOST ARE BUILT INTO HARNESS AND ARE NOT ACCESSIBLE

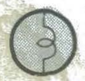
GROUND CONNECTION



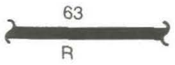
FUSE LINK



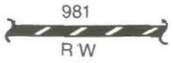
SIGNAL GENERATOR



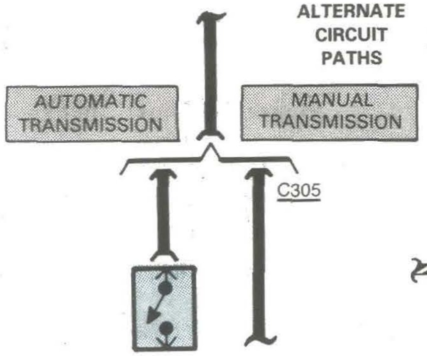
SINGLE FILAMENT LIGHT BULB



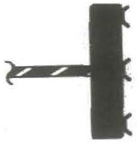
SOLID WIRE



STRIPED WIRE

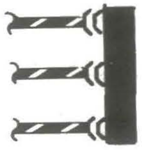


ALTERNATE CIRCUIT PATHS

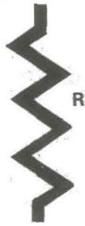


CANDELABRA CONNECTOR

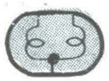
ACCEPTS SINGLE-PIN CONNECTORS



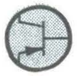
JUNCTION BLOCK



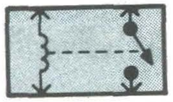
RESISTOR



DUAL FILAMENT LIGHT BULB



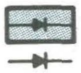
TRANSISTOR



RELAY

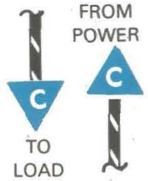
CONTACTS CLOSE WITH CURRENT THROUGH COIL

DASHED LINE SHOWS MECHANICAL CONNECTIONS



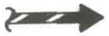
DIODES

CURRENT FLOWS IN DIRECTION OF ARROW ONLY



"CUT" WIRE REFERENCED BETWEEN PAGES

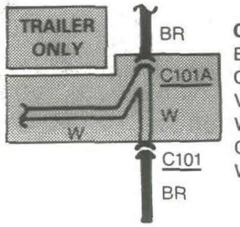
ARROWS SHOW CURRENT FLOW FROM POWER TO GROUND



BACKUP LIGHTS

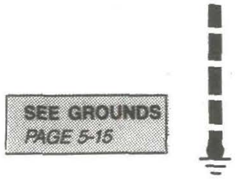
"REFERENCE" WIRES

COMPLETE WIRING SHOWN ON ANOTHER PAGE



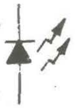
OPTIONAL WIRING

BR WIRES (INCLUDING C101) ARE ON ALL VEHICLES, BUT W WIRES (INCLUDING C101A) ARE USED ONLY WITH TRAILER

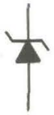


DASHED WIRE

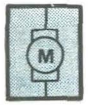
CIRCUITRY IS NOT SHOWN IN COMPLETE DETAIL, BUT IS COMPLETE ON ANOTHER PAGE



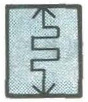
LIGHT EMITTING DIODE



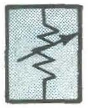
ZENER DIODE



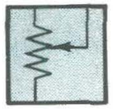
MOTOR



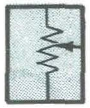
HEATING ELEMENT



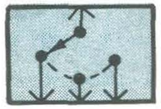
THERMISTOR



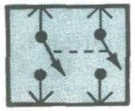
RHEOSTAT



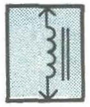
POTENTIOMETER



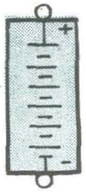
MULTIPLE POSITION SWITCH



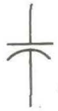
GANGED SWITCHES



SOLENOID

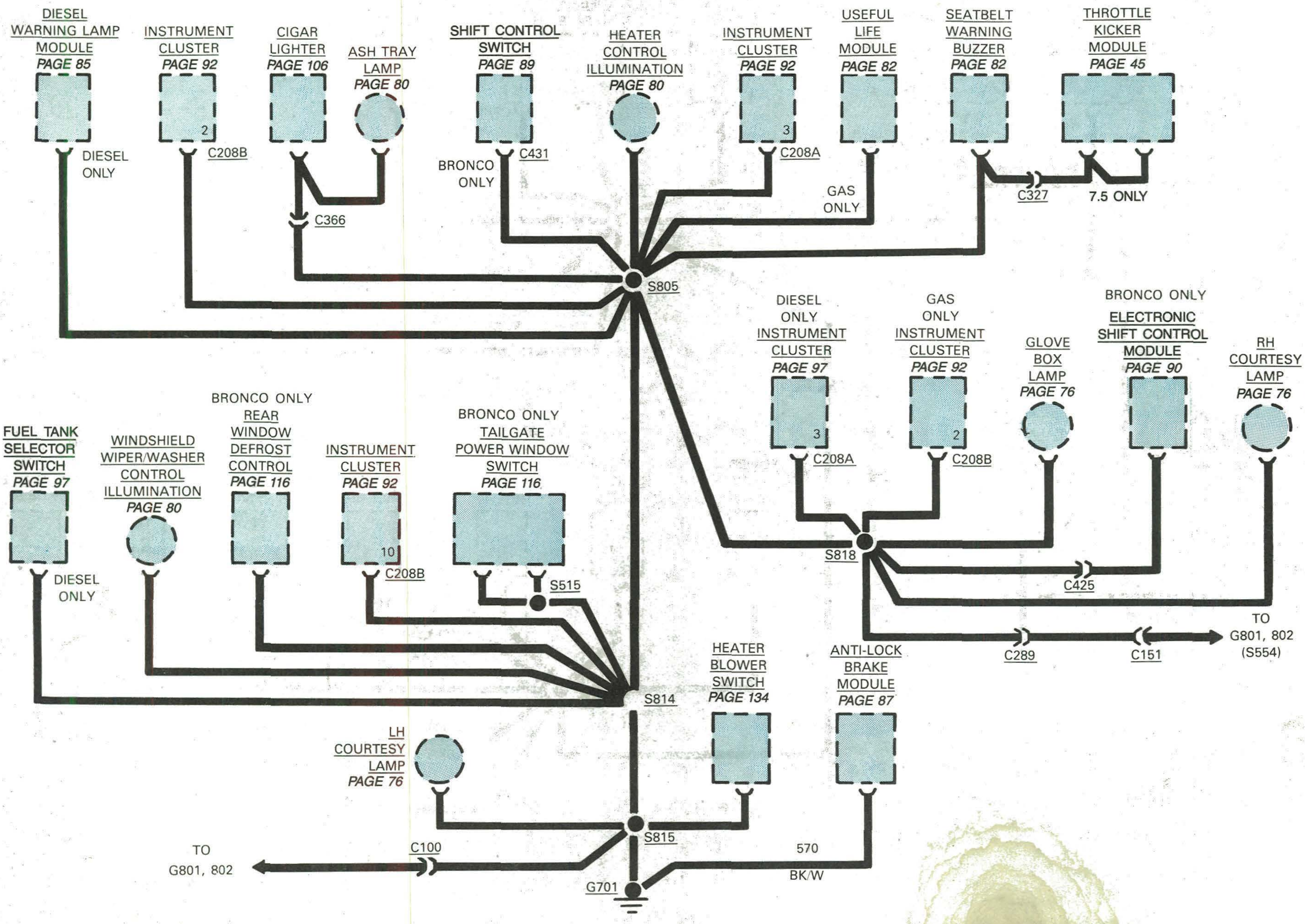


12V BATTERY



CAPACITOR

INSTRUMENT PANEL GROUND


DIESEL WARNING LAMP MODULE PAGE 85
DIESEL ONLY
INSTRUMENT CLUSTER PAGE 92
2
C208B
CIGAR LIGHTER PAGE 106
ASH TRAY LAMP PAGE 80
C366
SHIFT CONTROL SWITCH PAGE 89
BRONCO ONLY
C431
HEATER CONTROL ILLUMINATION PAGE 80
INSTRUMENT CLUSTER PAGE 92
3
C208A
USEFUL LIFE MODULE PAGE 82
GAS ONLY
SEATBELT WARNING BUZZER PAGE 82
THROTTLE KICKER MODULE PAGE 45
C327
7.5 ONLY
S805
DIESEL ONLY INSTRUMENT CLUSTER PAGE 97
3
C208A
GAS ONLY INSTRUMENT CLUSTER PAGE 92
2
C208B
GLOVE BOX LAMP PAGE 76
BRONCO ONLY
ELECTRONIC SHIFT CONTROL MODULE PAGE 90
RH COURTESY LAMP PAGE 76
S818
C425
C289
C151
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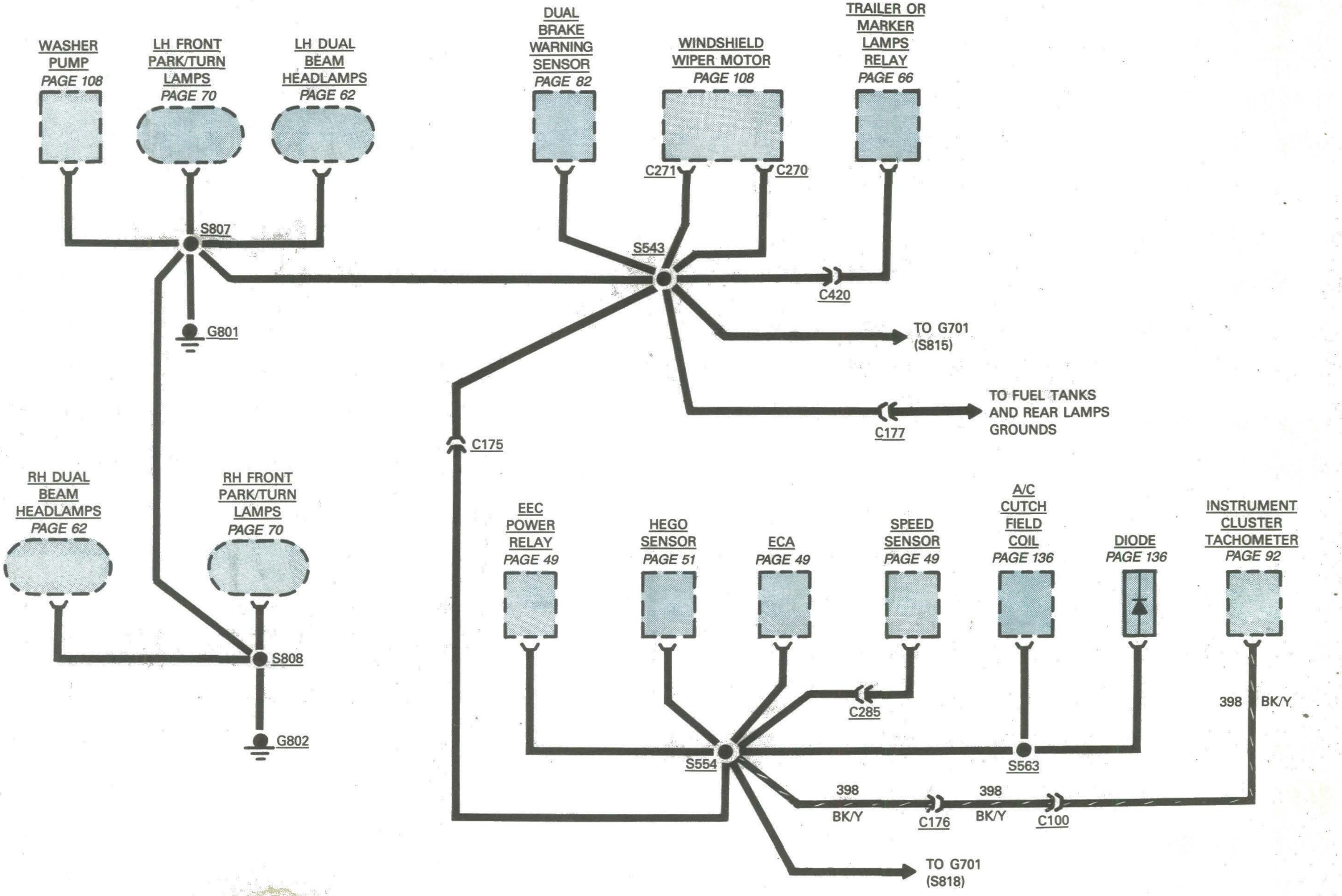
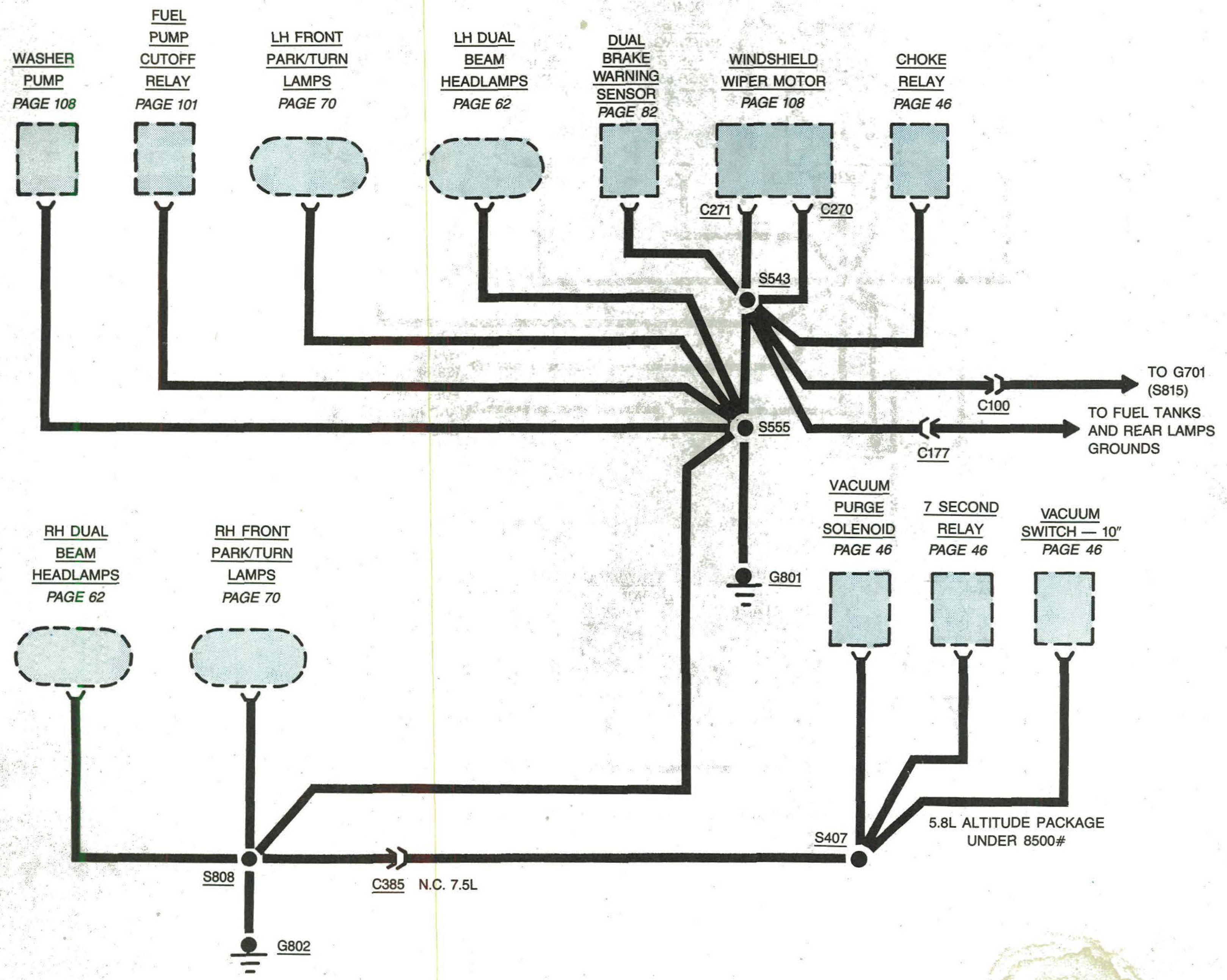
FUEL TANK SELECTOR SWITCH PAGE 97
DIESEL ONLY
WINDSHIELD WIPER/WASHER CONTROL ILLUMINATION PAGE 80
BRONCO ONLY
REAR WINDOW DEFROST CONTROL PAGE 116
INSTRUMENT CLUSTER PAGE 92
10
C208B
BRONCO ONLY
TAILGATE POWER WINDOW SWITCH PAGE 116
S515
S814
HEATER BLOWER SWITCH PAGE 134
ANTI-LOCK BRAKE MODULE PAGE 87
LH COURTESY LAMP PAGE 76
S815
TO G801, 802
C100
570
BK/W
G701

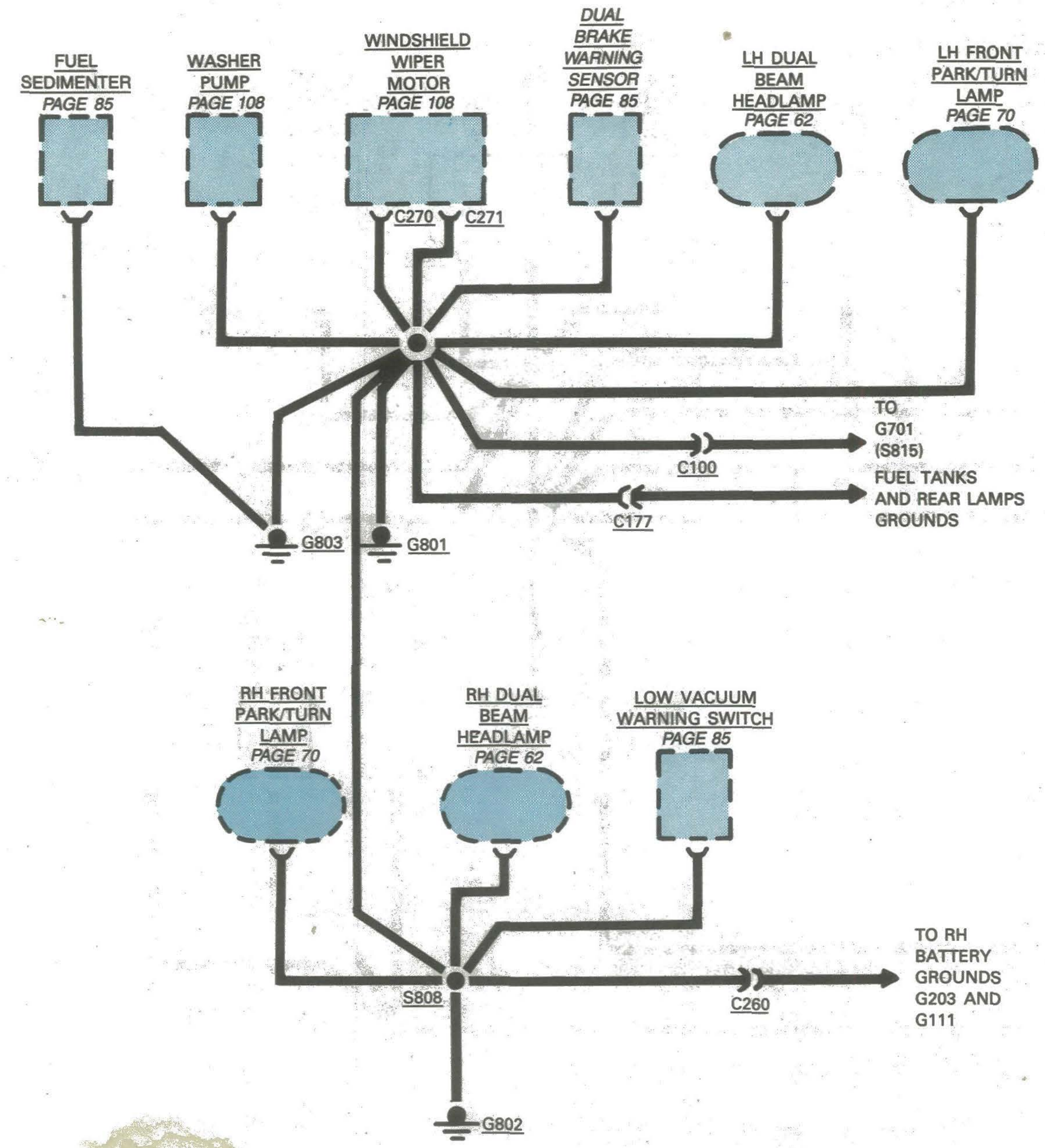
GROUNDS (G801, 802) (4.9L AND 5.0L GASOLINE)


WASHER PUMP PAGE 108
LH FRONT PARK/TURN LAMPS PAGE 70
LH DUAL BEAM HEADLAMPS PAGE 62
DUAL BRAKE WARNING SENSOR PAGE 82
WINDSHIELD WIPER MOTOR PAGE 108
TRAILER OR MARKER LAMPS RELAY PAGE 66
C271
C270
S807
S543
C420
G801
TO G701 (S815)
TO FUEL TANKS AND REAR LAMPS GROUNDS
C177
C175
RH DUAL BEAM HEADLAMPS PAGE 62
RH FRONT PARK/TURN LAMPS PAGE 70
S808
G802
EEC POWER RELAY PAGE 49
HEGO SENSOR PAGE 51
ECA PAGE 49
SPEED SENSOR PAGE 49
A/C CUTCH FIELD COIL PAGE 136
DIODE PAGE 136
INSTRUMENT CLUSTER TACHOMETER PAGE 92
398 BK/Y
C285
S554
S563
398
BK/Y
C176
398
BK/Y
C100
TO G701 (S818)

GROUNDS (G801, G802) (5.8L AND 7.5L GASOLINE)


WASHER PUMP PAGE 108
FUEL PUMP CUTOFF RELAY PAGE 101
LH FRONT PARK/TURN LAMPS PAGE 70
LH DUAL BEAM HEADLAMPS PAGE 62
DUAL BRAKE WARNING SENSOR PAGE 82
WINDSHIELD WIPER MOTOR PAGE 108
CHOKE RELAY PAGE 46
C271
C270
S543
TO G701 (S815)
C100
S555
TO FUEL TANKS AND REAR LAMPS GROUNDS
C177
G801
VACUUM PURGE SOLENOID PAGE 46
7 SECOND RELAY PAGE 46
VACUUM SWITCH — 10″ PAGE 46
RH DUAL BEAM HEADLAMPS PAGE 62
RH FRONT PARK/TURN LAMPS PAGE 70
5.8L ALTITUDE PACKAGE UNDER 8500#
S407
S808
C385
N.C. 7.5L
G802

GROUNDS (G801, G802, G803) (6.9L DIESEL)


FUEL SEDIMENTER PAGE 85
WASHER PUMP PAGE 108
WINDSHIELD WIPER MOTOR PAGE 108
DUAL BRAKE WARNING SENSOR PAGE 85
LH DUAL BEAM HEADLAMP PAGE 62
LH FRONT PARK/TURN LAMP PAGE 70
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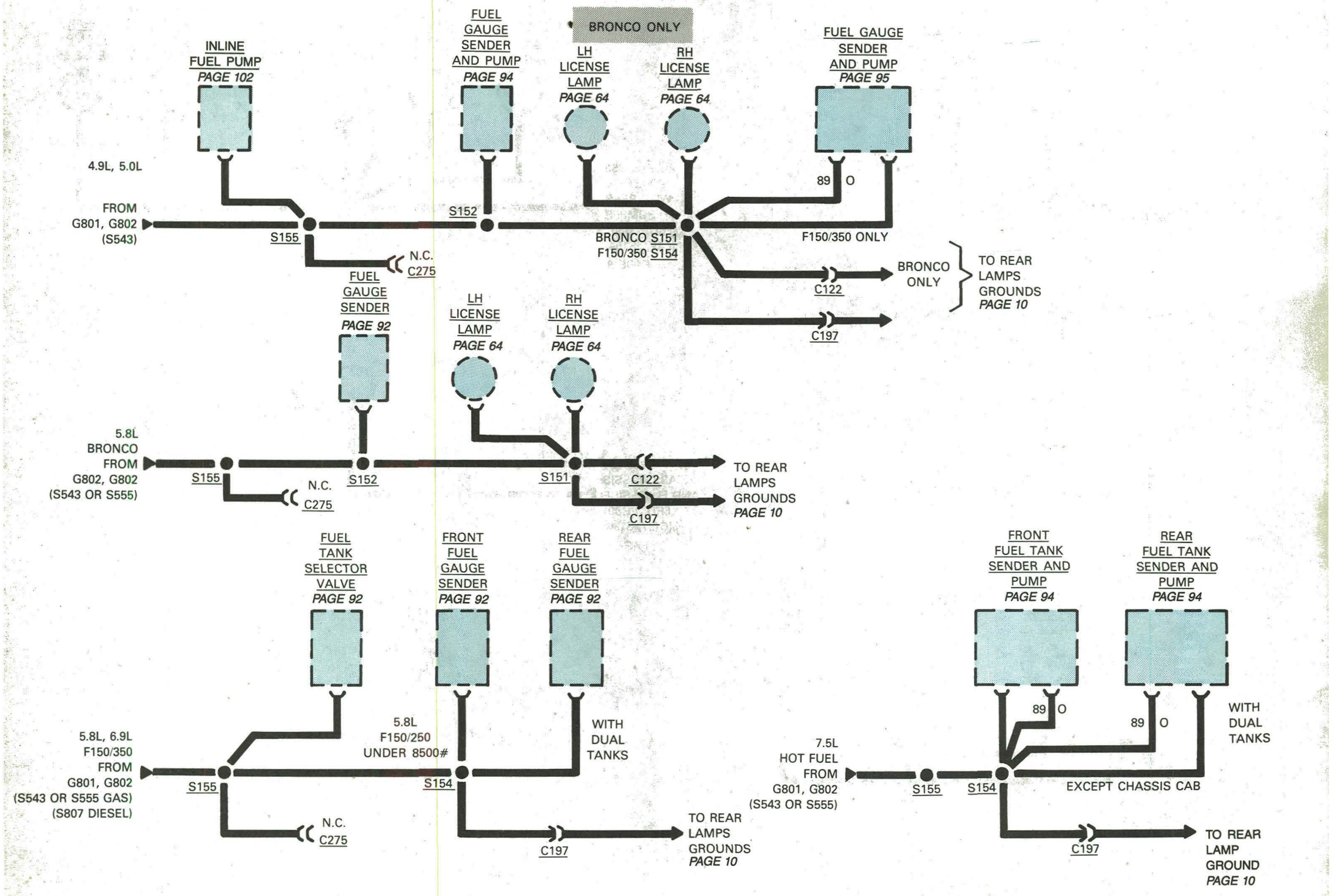
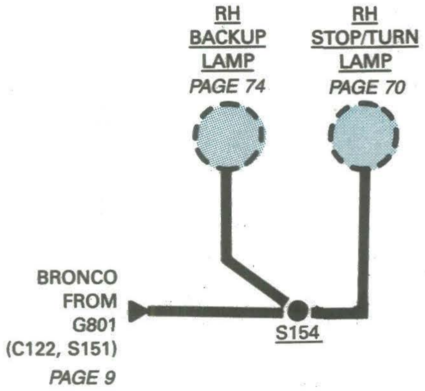
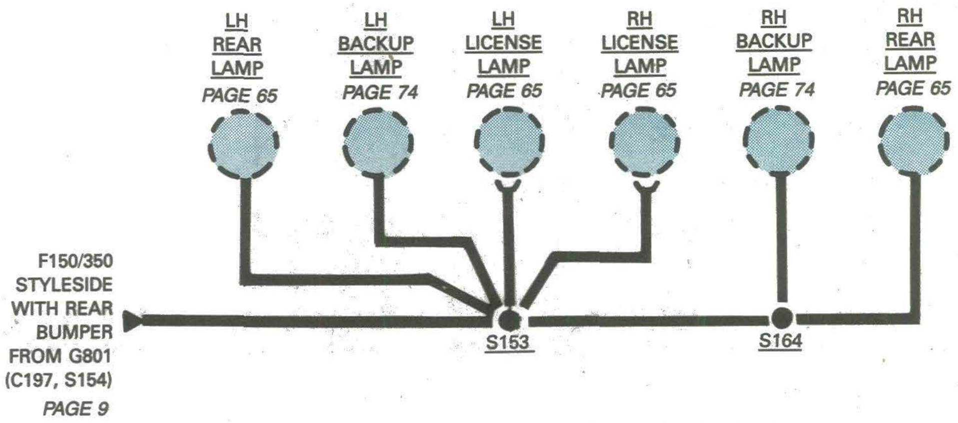
C271
TO G701 (S815)
C100
FUEL TANKS AND REAR LAMPS GROUNDS
C177
G803
G801
RH FRONT PARK/TURN LAMP PAGE 70
RH DUAL BEAM HEADLAMP PAGE 62
LOW VACUUM WARNING SWITCH PAGE 85
S808
C260
TO RH BATTERY GROUNDS G203 AND G111
G802

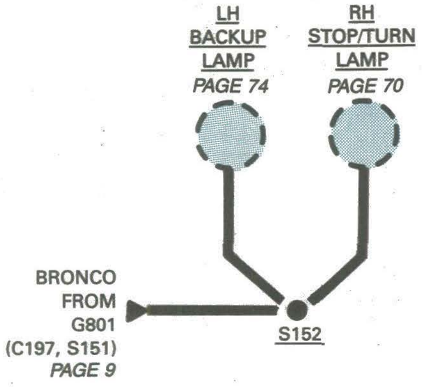
GROUNDS (FUEL TANKS AND REAR LAMPS)

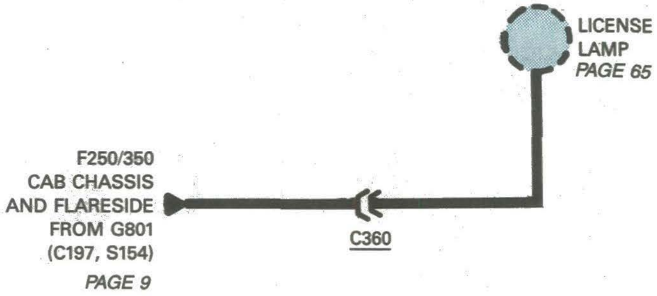


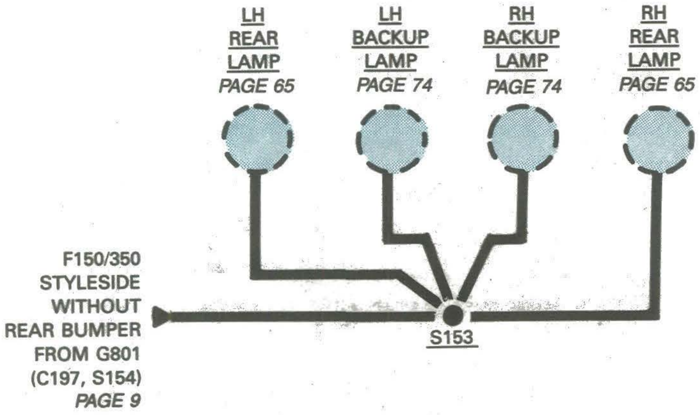
GROUNDS (REAR LAMPS)



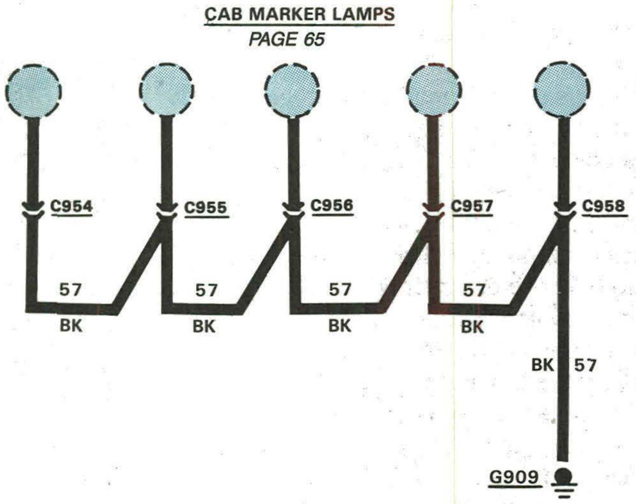


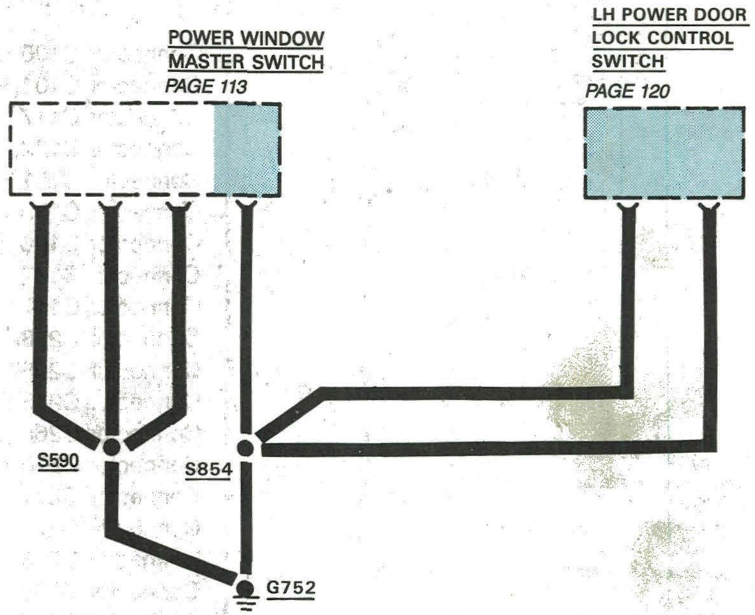


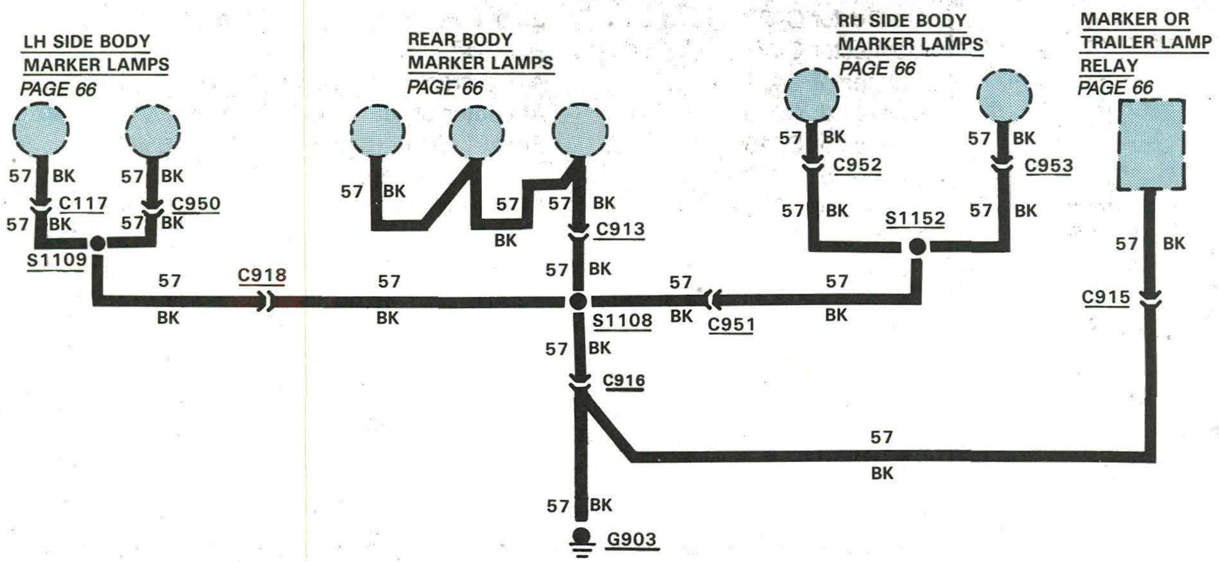


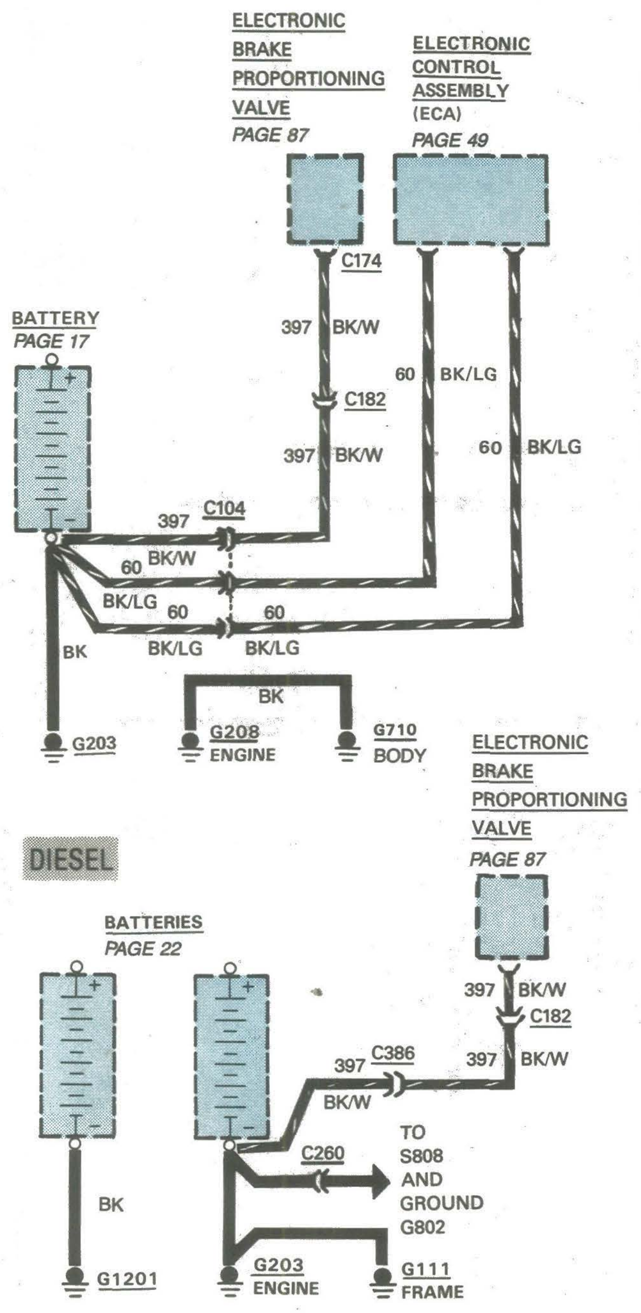


GROUNDS (G903, G909, G752)









COMPONENT LOCATION

		Page-Figure	Color	Terminals
Connector C100	Through dash at LH side			53
Connector C104	At battery ground pigtail			4
Connector C117	At LH front side body marker lamp	69-8	BR	2
Connector C122	RH side of rear cross support	68-3		4
Connector C151	Engine compartment		BK	2
Connector C175	Engine compartment LH side			10
Connector C176	Engine compartment LH side			8
Connector C177	Engine compartment LH side		GY	12
Connector C197	LH side of rear cross support			8
Connector C208A	Behind instrument cluster			14
Connector C208B	Behind instrument cluster			14
Connector C248	Engine compartment near starter relay		GY/BK	4
Connector C260	Near RH battery		BK	1
Connector C270	At wiper motor			3
Connector C271	At wiper motor			3
Connector C275	Engine compartment LH rear			8
Connector C285	At speed sensor		BR	2
Connector C289	RH cowl		BK	4
Connector C327	Behind LH side of I/P	48-1		3
Connector C366	Behind center of I/P		GY	3
Connector C386	Near RH battery			1
Connector C420	Engine compartment LH side		BK	4
Connector C425	RH cowl		BK	6
Connector C431	At electronic shift switch			6
Connector C913	At center of rear body markers	69-5	GY	2
Connector C915	Engine compartment LH side		BK	2
Connector C916	LH rear of frame	68-1	BK	2
Connector C918	LH rear of frame	68-1	GY	2
Connector C950	At LH rear fender	69-8	BR	2
Connector C951	RH rear of frame	69-6	BR	2

(Continued on next page)

HOW THE CIRCUIT WORKS

The ground circuits shown here are complete and connect several components together to screw terminal ground points. On other pages only parts of these circuits may be shown. Partial ground circuits are shown dashed on those pages.

All simple or component ground circuits are shown on the individual circuit pages and are complete on those pages.

All ground wires are **57 BK** unless otherwise noted.

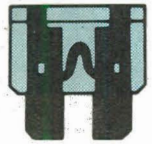
COMPONENT LOCATION

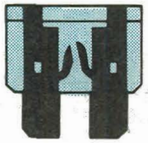
(Continued from previous page)

		Page-Figure	Color	Terminals
Connector C952	At front of RH rear fender		BR	2
Connector C953	At rear of RH rear fender	69-8	BR	2
Connector C954	At front of cab roof	67-1	BR	2
Connector C955	At front of cab roof	67-1	BK	2
Connector C956	At front of cab roof	67-1	BK	2
Connector C957	At front of cab roof	67-1	BK	2
Connector C958	At front of cab roof	67-1	BK	2
Ground G111	RH frame near battery	26-2		
Ground G203	RH side of engine	21-1		
Ground G208	Near throttle position solenoid	35-2, 37-4		
Ground G210	At electronic voltage regulator			
Ground G211	Near starter motor relay			
Ground G701	Behind I/P near center			
Ground G710	LH side of dash panel			
Ground G752	In LH door	114-1		
Ground G801	LH inner fender behind headlamps			
Ground G802	RH inner fender behind headlamps			
Ground G803	At fuel sedimenter bolt			
Ground G903	At LH side of rear crossmember	68-1		
Ground G909	At lower LH cowl access hole	69-7		
Ground G1201	At front LH side of engine	26-1		
Splice S151	Near license lamp T/O			
Splice S152	Near LH backup lamp T/O			
Splice S153	Near license lamp T/O			
Splice S154	Near front fuel gage sender T/O			
Splice S155	Near electronic rear brake pressure valve T/O			
Splice S164	Near license lamp T/O			
Splice S515	Behind I/P near liftgate power window switch T/O			
Splice S543	Engine compartment near brake sensor T/O			
Splice S554	Engine compartment near speed sensor T/O			
Splice S555	Engine compartment near ignition module T/O			
Splice S563	Engine compartment near A/C compressor clutch T/O			
Splice S590	In LH door near power window switch T/O			
Splice S805	Near cigar lighter T/O			
Splice S807	Near LH headlamp T/O			
Splice S808	Near RH front park lamp T/O			

Splice S814	Near W/S wiper illumination lamp T/O
Splice S815	Near G701 T/O
Splice S818	Near RH courtesy lamp T/O
Splice S854	Near LH master window switch T/O
Splice S1108	Near rear marker lamp T/O
Splice S1109	Near LH front side marker lamp T/O
Splice S1152	Near RH front side marker lamp T/O

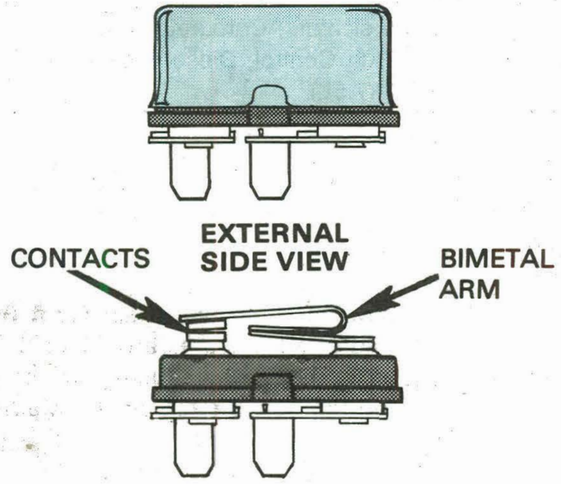
REPLACEMENT OF FUSES/ CIRCUIT BREAKERS


GOOD FUSE

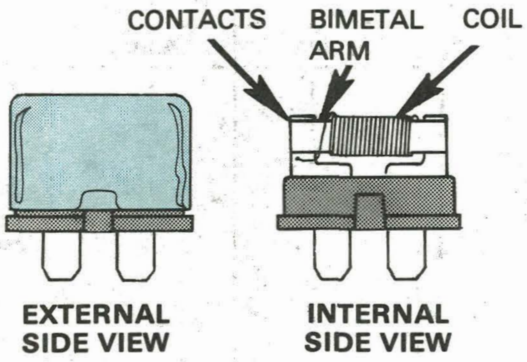

BLOWN FUSE

Fuses are mounted either in the **Fuse Panel** or in-line. They are identified by the numbered value in amperes, and by a color code. Some positions may have either a fuse with adapter or a circuit breaker. Be sure to replace a fuse or circuit breaker with the same kind of unit and with the same ampere rating. Remove fuses in order to check them.

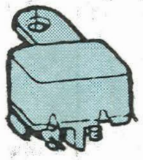
CIRCUIT BREAKER OPERATION



Cycling Fuse Block Type



Non-Cycling Fuse Block Type



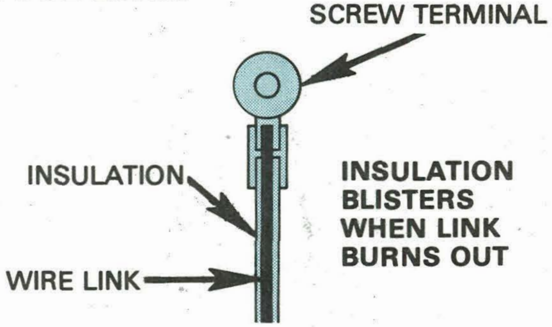
Cycling In-Line Type

Some circuits are protected by circuit breakers. (Abbreviated "c.b." in fuse chart.) **They can be Fuse Panel mounted or in-line. Like fuses, they are rated in amperes.**

Each circuit breaker conducts current through an arm made of two types of metal bonded together (bimetal arm). If the arm starts to carry too much current, it heats up. As one metal expands faster than the other, the arm bends, opening the contacts. Current flow is broken. In the cycling type, the arm cools and straightens out. This closes the circuit again. This cycle repeats as long as the overcurrent exists, with power applied.

In the non-cycling type, there is also a coil wrapped around the bimetal arm. When an overcurrent exists and the contacts open, a small current passes through the coil. This current through the coil is not large enough to operate a load, but it does heat up both the coil and bimetal arm. This keeps the arm in the open position until power is removed.

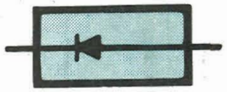
FUSE LINKS



The fuse link is a short length of wire smaller in gage than the wire in the protected circuit. The wire is covered with a thick non-flammable insulation. An overload causes the link to heat and the insulation to blister. If the overload remains, the link will melt, causing an open circuit.

When replacing, make tight crimp joints or hot solder joints for good connections.

DIODES



Diodes are electrical devices that permit current to flow in one direction only. The current flows in the direction indicated by the arrow.

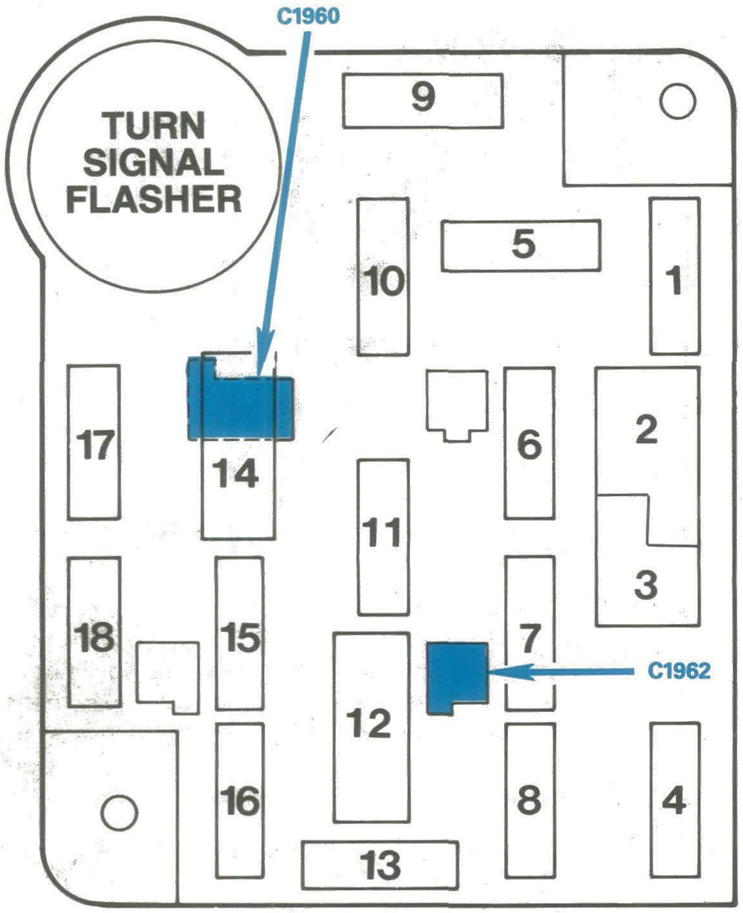


Figure 1 - Fuse Panel

Fuse Position	Amps	Circuits Protection
1	15	Turn/Stop/Hazard Lamps; Speed Control
2	—	(Not used)
3	—	(Not used)
4	15	Exterior Lamps; Instrument Illumination
5	15	Turn Lamps; Backup Lamps; Rear Window Defrost
6	15	Speed Control; Electronic Shift-4 Wheel Drive
7	—	(Not Used)
8	15	Courtesy, Dome, Cargo Lamps; Warning Buzzer
9	30	Heater; A/C-Heater
10	20	Anti-lock Brakes
11	15	Radio; Main Light Switch; Clock Illumination
12	25	Tailgate Power Window; Power Mirrors
	30 c.b.	Power Door Locks; Electronic Shift-4 Wheel Drive
13	—	(Not used)
14	25	Tailgate Power Window
	30 c.b.	Power Windows
15	10	Auxiliary Fuel Tank Selector
16	30	Horn; Cigar Lighter; Speed Control; 4.9L EFI After Run Blower
17	5	Instrument Illumination; Clock Dimming
18	15	Seatbelt Buzzer; Warning Indicators; Carburetor Circuits; Tachometer; Diesel Glow Plug Control; Diesel Indicators; Electric Fuel Pump Control (7.5L)

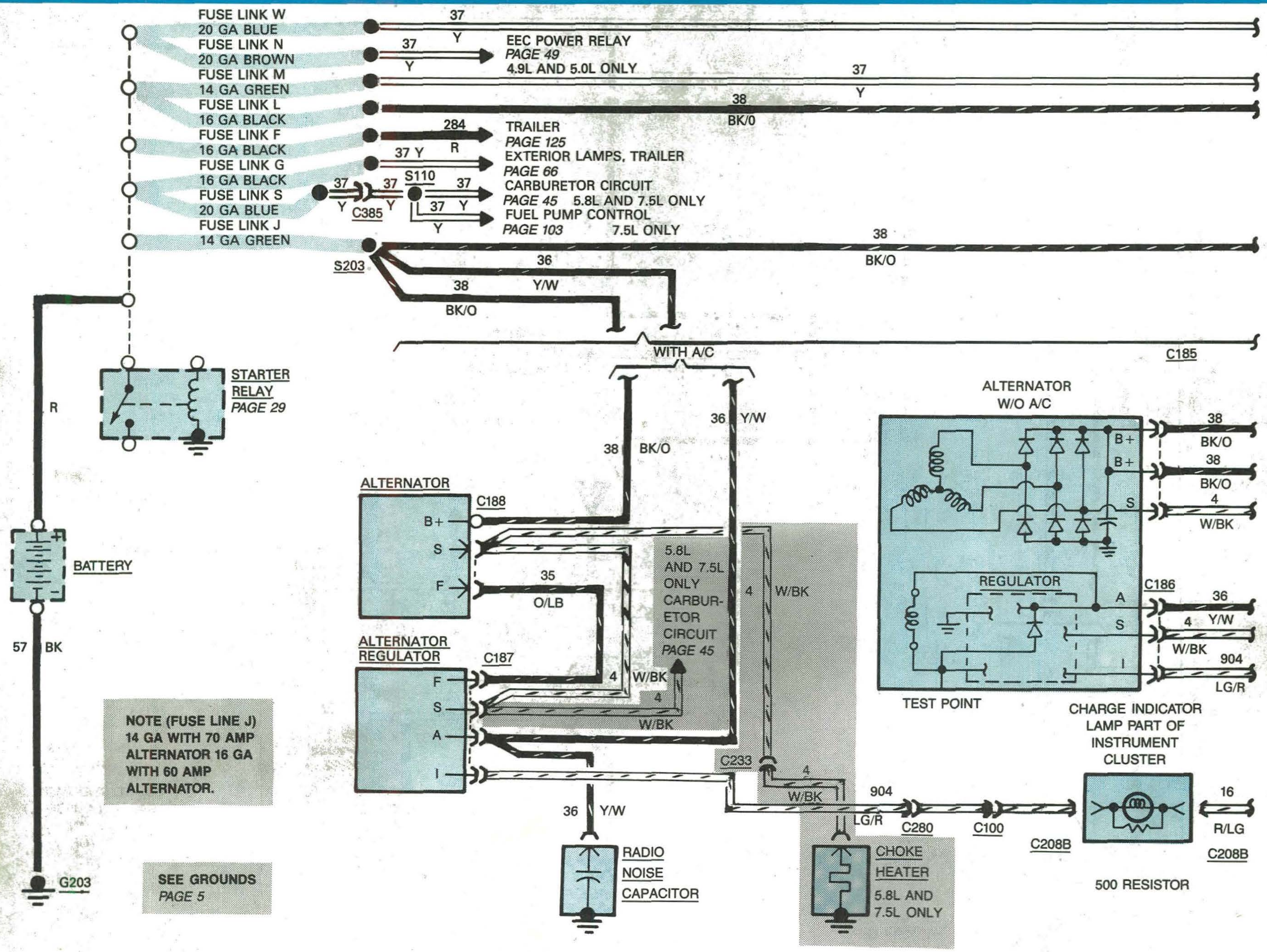
Fuse Value Amps	Color Code
4	Pink
5	Tan
10	Red
15	Light Blue
20	Yellow
25	Natural
30	Light Green

Power Distribution

The **Alternator** and **Battery** are connected together at the **Starter Relay** hot terminal. Other circuits originate at the **Starter Relay** hot terminal and are protected by fuse links. Low power circuits are also protected by fuses.

The **Ignition Switch** and **Main Light Switch** are powered at all times as are **Fuses 1, 4, 8, 12,** and **16.** The other fuses are powered through the **Ignition Switch** or the Main Light Switch.

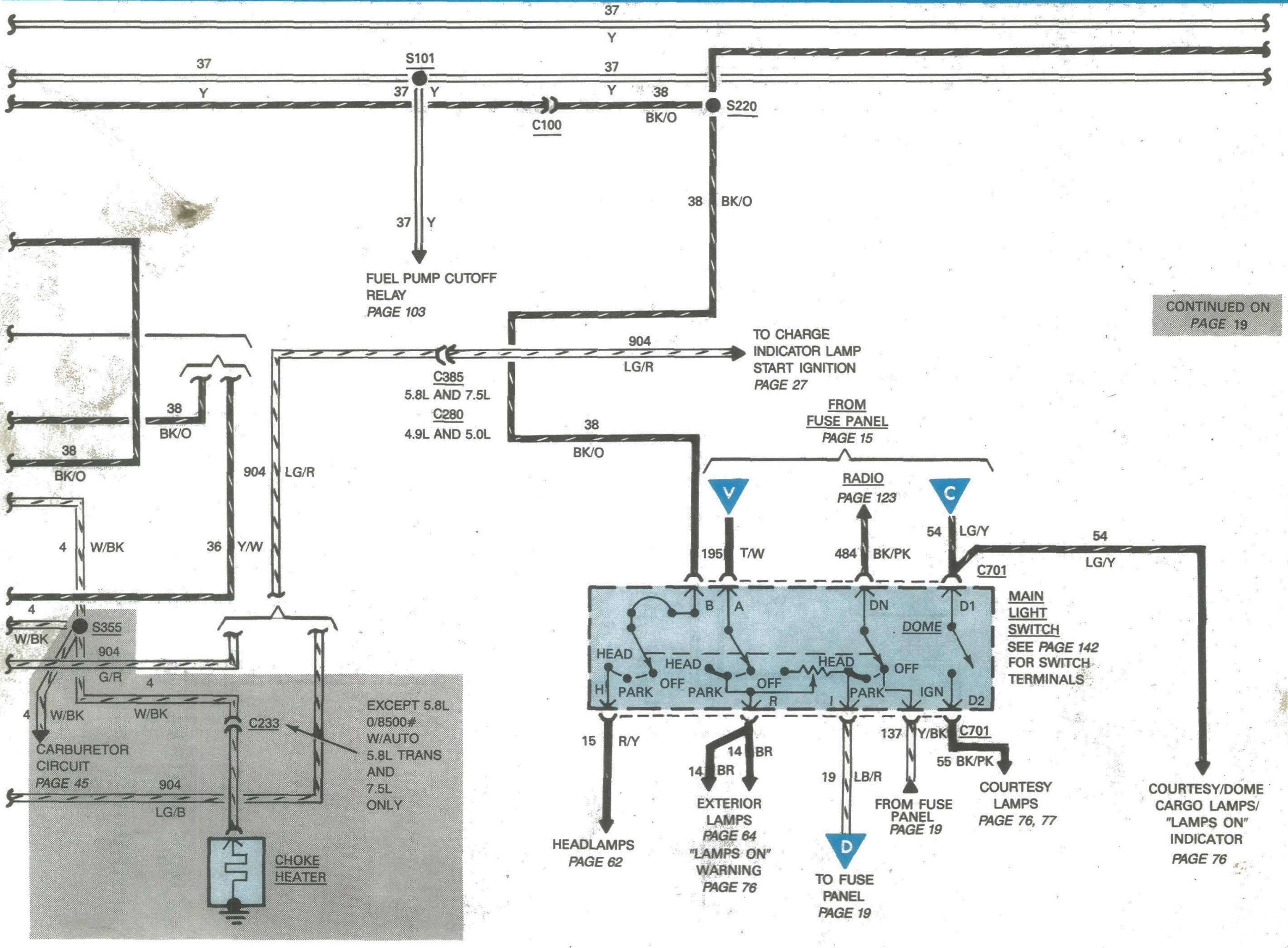
CHARGE/POWER DISTRIBUTION (GASOLINE)



**NOTE (FUSE LINE J)
14 GA WITH 70 AMP
ALTERNATOR 16 GA
WITH 60 AMP
ALTERNATOR.**

SEE GROUNDS
PAGE 5

CHARGE/POWER DISTRIBUTION (GASOLINE)



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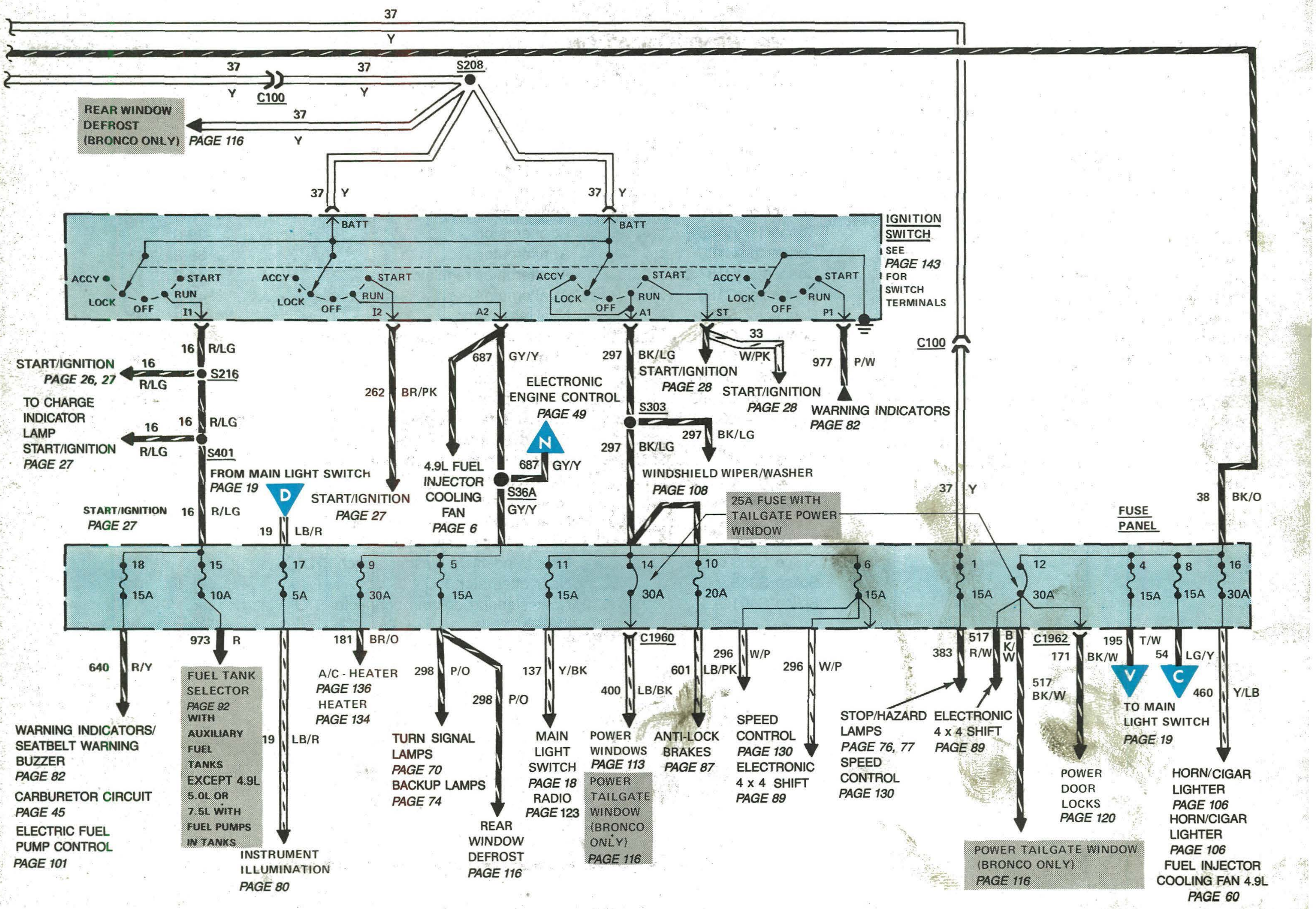
PAGE 19


37
Y
37
Y
C100
37
Y
S208
REAR WINDOW DEFROST (BRONCO ONLY) PAGE 116
37
Y
37 Y
37 Y
BATT
BATT
IGNITION SWITCH
SEE PAGE 143 FOR SWITCH TERMINALS
ACCY
START
LOCK
RUN
OFF
I1
ACCY
START
LOCK
RUN
OFF
I2
A2
ACCY
START
LOCK
RUN
OFF
A1
ST
ACCY
START
LOCK
RUN
OFF
P1
16 R/LG
START/IGNITION PAGE 26, 27
16 R/LG
S216
TO CHARGE INDICATOR LAMP
START/IGNITION PAGE 27
16 R/LG
16 R/LG
S401
FROM MAIN LIGHT SWITCH PAGE 19
D
START/IGNITION PAGE 27
16 R/LG
19 LB/R
262 BR/PK
START/IGNITION PAGE 27
687 GY/Y
4.9L FUEL INJECTOR COOLING FAN PAGE 6
ELECTRONIC ENGINE CONTROL PAGE 49
N
687 GY/Y
S36A
GY/Y
297 BK/LG
START/IGNITION PAGE 28
33 W/PK
START/IGNITION PAGE 28
977 P/W
WARNING INDICATORS PAGE 82
S303
297 BK/LG
297 BK/LG
WINDSHIELD WIPER/WASHER PAGE 108
25A FUSE WITH TAILGATE POWER WINDOW
C100
37 Y
38 BK/O
FUSE PANEL
18 15A
15 10A
17 5A
9 30A
5 15A
11 15A
14 30A
10 20A
6 15A
1 15A
12 30A
4 15A
8 15A
16 30A
640 R/Y
WARNING INDICATORS/ SEATBELT WARNING BUZZER PAGE 82
CARBURETOR CIRCUIT PAGE 45
ELECTRIC FUEL PUMP CONTROL PAGE 101
973 R
FUEL TANK SELECTOR PAGE 92 WITH AUXILIARY FUEL TANKS EXCEPT 4.9L 5.0L OR 7.5L WITH FUEL PUMPS IN TANKS
19 LB/R
INSTRUMENT ILLUMINATION PAGE 80
181 BR/O
A/C - HEATER PAGE 136
HEATER PAGE 134
298 P/O
TURN SIGNAL LAMPS PAGE 70
BACKUP LAMPS PAGE 74
298 P/O
REAR WINDOW DEFROST PAGE 116
137 Y/BK
MAIN LIGHT SWITCH PAGE 18
RADIO PAGE 123
C1960
400 LB/BK
POWER WINDOWS PAGE 113
POWER TAILGATE WINDOW (BRONCO ONLY) PAGE 116
601 LB/PK
ANTI-LOCK BRAKES PAGE 87
296 W/P
SPEED CONTROL PAGE 130
ELECTRONIC 4 x 4 SHIFT PAGE 89
296 W/P
STOP/HAZARD LAMPS PAGE 76, 77
SPEED CONTROL PAGE 130
383
517 R/W
B K/ W
ELECTRONIC 4 x 4 SHIFT PAGE 89
C1962
171 BK/W
517 BK/W
POWER TAILGATE WINDOW (BRONCO ONLY) PAGE 116
POWER DOOR LOCKS PAGE 120
195 T/W
V
54 LG/Y
C
TO MAIN LIGHT SWITCH PAGE 19
460 Y/LB
HORN/CIGAR LIGHTER PAGE 106
HORN/CIGAR LIGHTER PAGE 106
FUEL INJECTOR COOLING FAN 4.9L PAGE 60

HOW THE CIRCUIT WORKS

The **Battery, Alternator** and **Voltage Regulator** make up the **Charging System**. With the **Ignition Switch** in RUN, **Battery** current flows through the solid-state electronic control of the **Voltage Regulator**. The electronic control applies **Battery** voltage to the **Alternator** field.

With current in the field and the rotor turning, the **Alternator** stator produces a DC voltage at B+ terminals (to **Battery**). If the **Alternator** output voltage is greater than the **Battery** terminal voltage, current will flow from the **Alternator** to the **Battery**, as well as to the vehicle electrical load.

If the **Alternator** voltage is less than the **Battery** terminal voltage, current will flow from the **Battery** to supplement the alternator output in supplying the vehicle electrical load. The **Choke Heater** operates only when the **Alternator** is generating current (through terminals). Above 60°F, the heater causes a thermostatic spring to pull the choke plates open within 1 to 1.5 minutes. Below 60°F, the heater does not operate and normal choke action occurs.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Choke Heater	Attached to carburetor	36-3, 37-5, 38-6		
Fuse Links F, G, J, L, M, N, S, W	Near starter relay			
Radio Noise Capacitor	Attached to voltage regulator			
Starter Relay	On RH fender apron			
Connector C100	LH thru dash			53
Connector C175	Engine compartment LH side			10
Connector C185	At alternator	39-8		3
Connector C186	At alternator	39-8		3
Connector C187	At alternator regulator	44-2	W	4
Connector C188	At alternator	44-2		2
Connector C233	Near alternator	36-3	GY	1
Connector C280	Engine compartment near starter relay			4
Connector C701	At main light switch		BK	8
Connector C1960	At fuse panel		N	1
Connector C1962	At fuse panel		BL	1
Ground G203	On RH side of engine	21-1, 21-2		
Splice S101	Behind I/P near fuel/tank selector switch T/O			
Splice S110	Near fuel pump cutoff relay T/O			
Splice S203	Near fuse link J			
Splice S208	Near main light switch T/O			
Splice S216	Near steering column connector T/O			
Splice S220	Near LH courtesy lamp T/O			
Splice S303	Near windshield washer switch T/O			
Splice S355	Near alternator T/O			
Splice S401	Near steering column connector T/O			

TROUBLESHOOTING HINTS

The most common charge system complaints are dead **Battery** and charge indicator **On** at normal speed.

- Check **Fuse Link J** at **Starter Relay.**
- Check **Alternator** belt tension.
- Check **Battery** terminals and cable clamps.
- Check for clean and tight connections on **Alternator** and **Starter Relay.**
- Read "Charging System Diagnosis" in the Shop Manual.

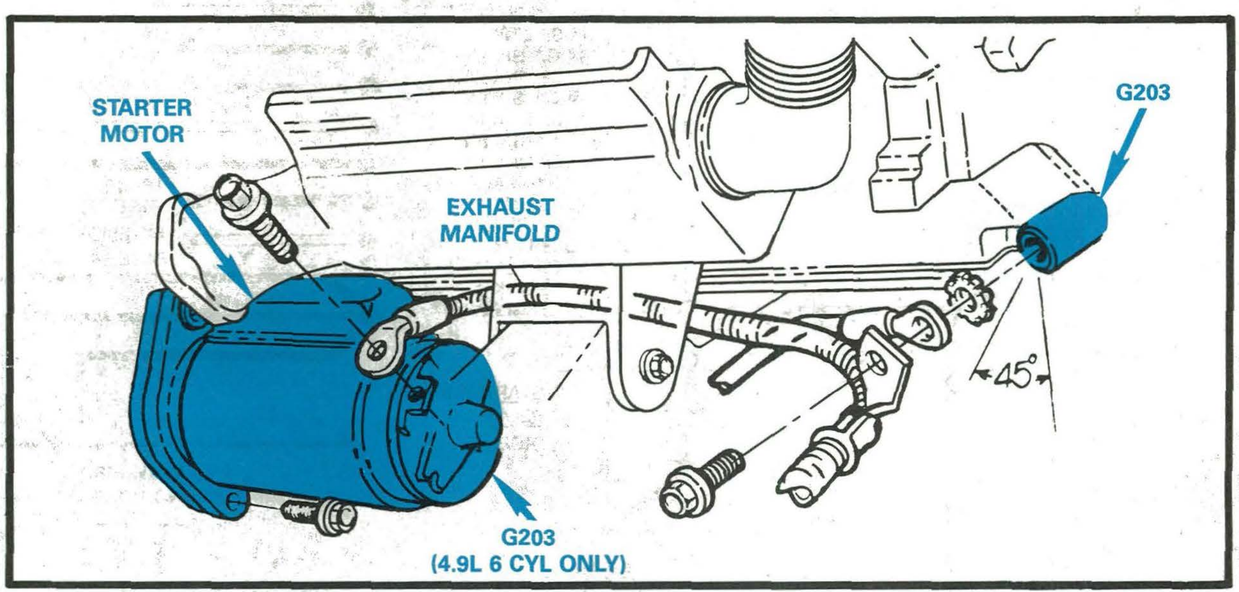


Figure 1 — Lower RH Side of Engine (5.0L, 5.8L, 7.5L, 8 Cyl.)

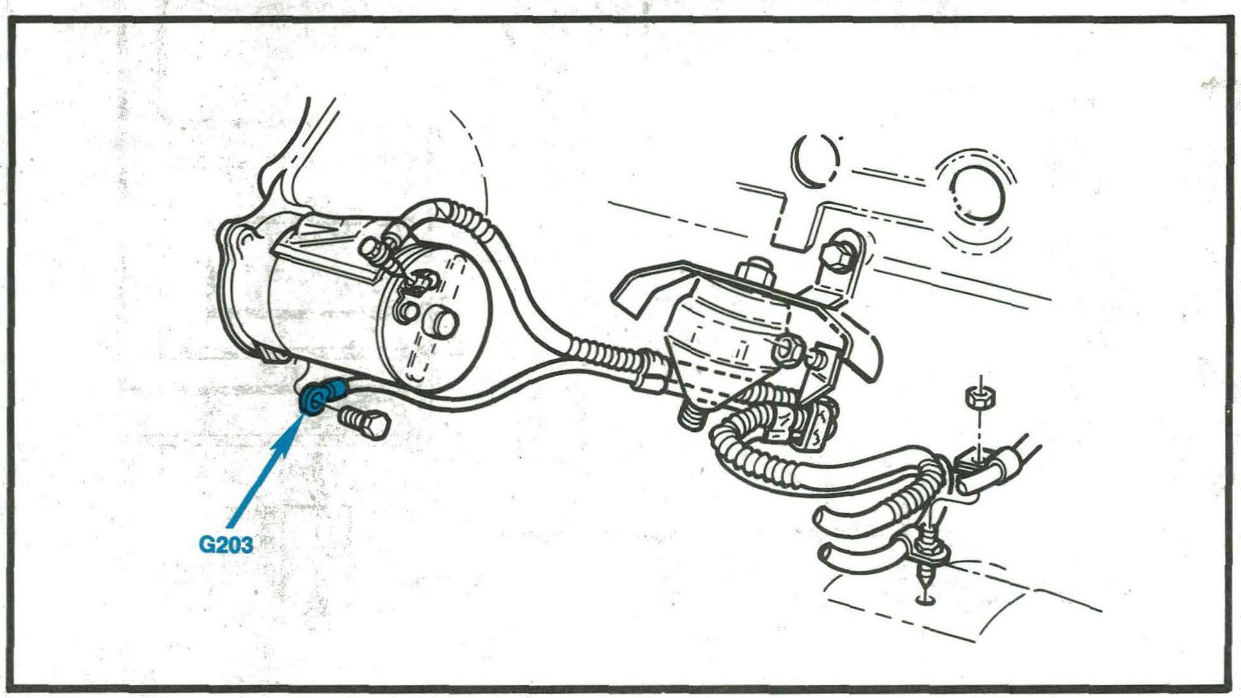
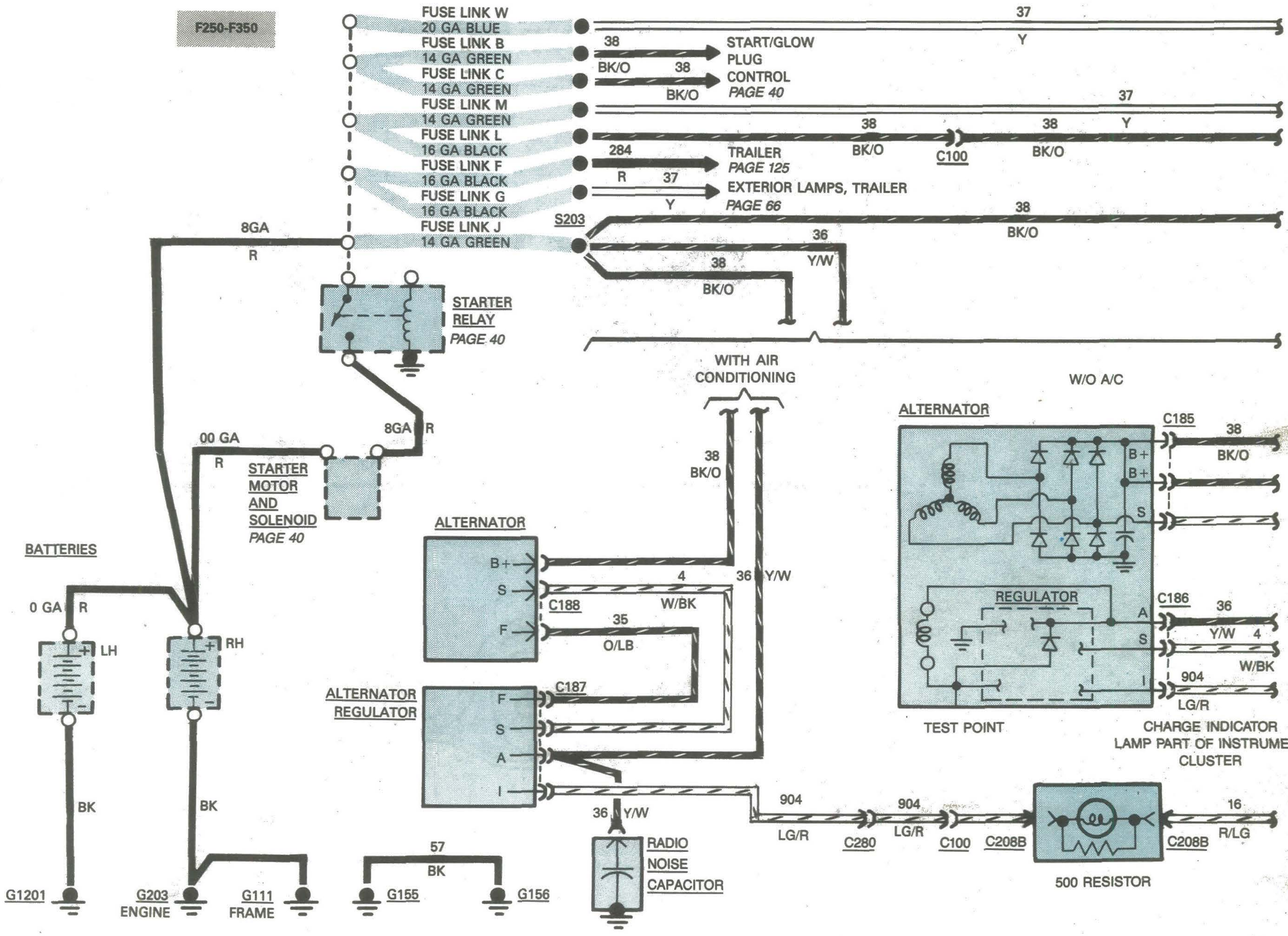
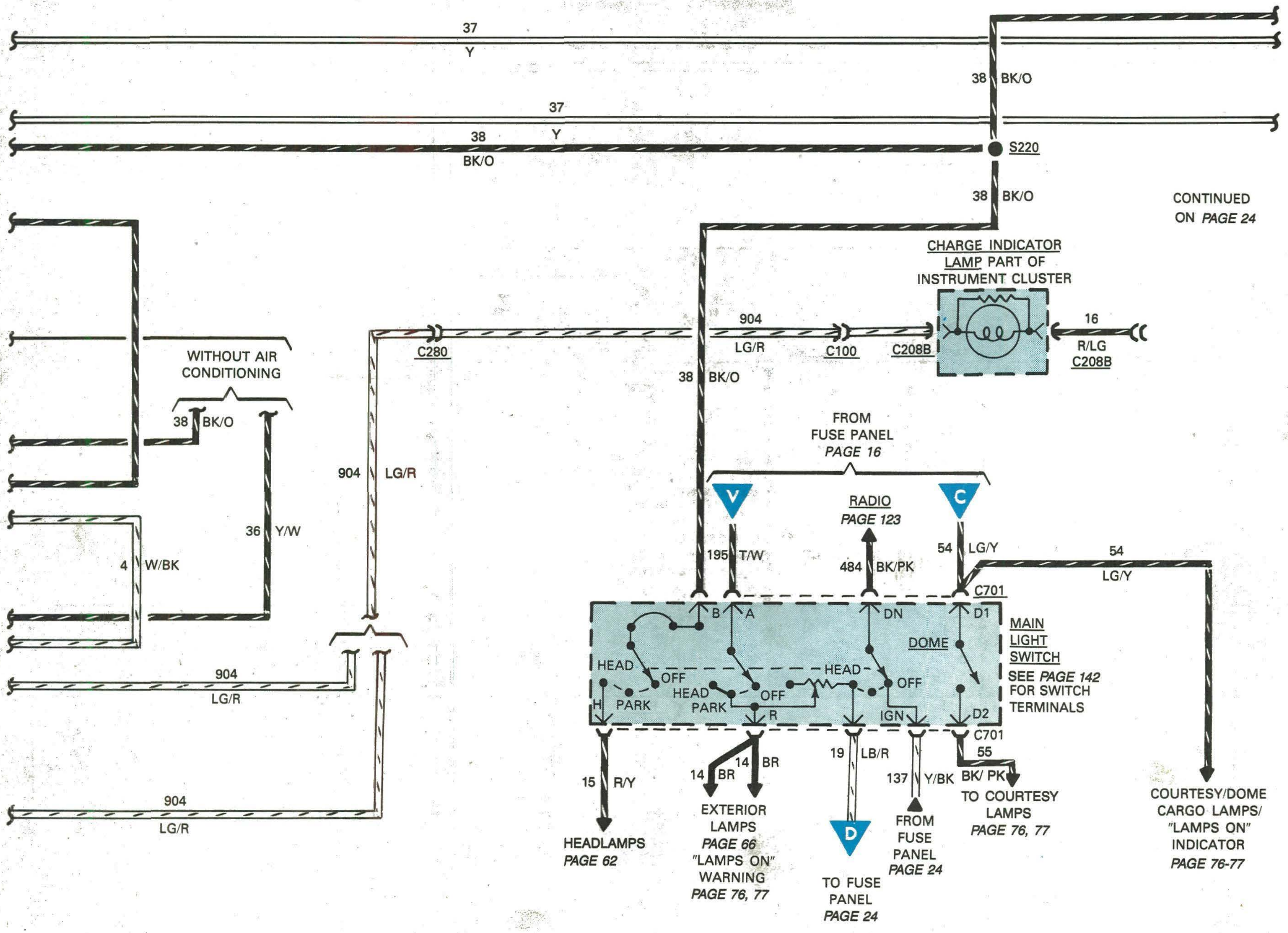


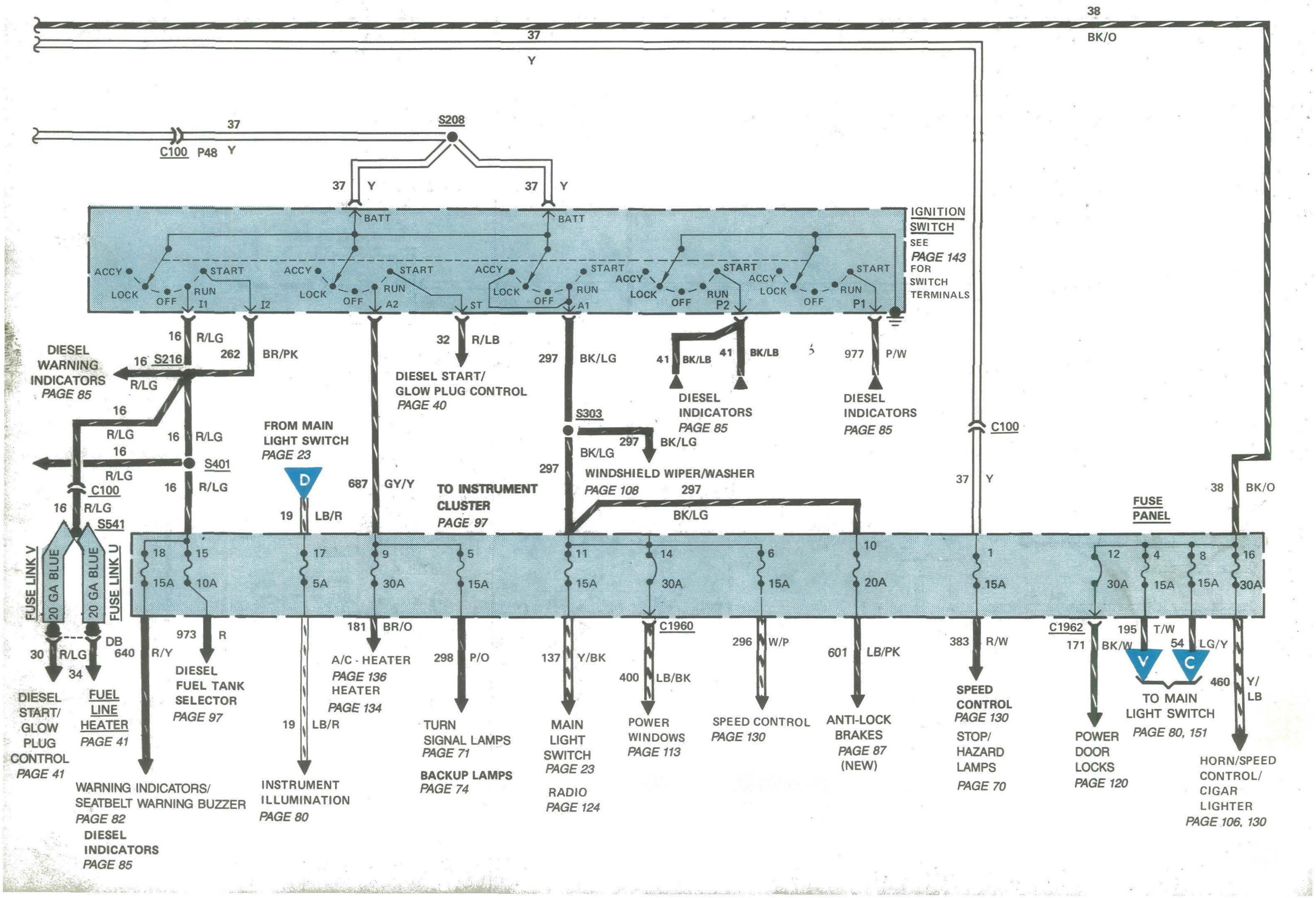
Figure 2 — Lower RH Side of Engine (4.9L 6 Cyl. ONLY)

CHARGE/POWER DISTRIBUTION (DIESEL)




37
Y
38
BK/O
37
Y
38
BK/O
S220
38
BK/O
CONTINUED ON PAGE 24
CHARGE INDICATOR LAMP PART OF INSTRUMENT CLUSTER
16
R/LG
C208B
904
LG/R
C100
C208B
C280
38
BK/O
WITHOUT AIR CONDITIONING
38
BK/O
904
LG/R
36
Y/W
4
W/BK
904
LG/R
904
LG/R
FROM FUSE PANEL PAGE 16
V
RADIO PAGE 123
C
195
T/W
484
BK/PK
54
LG/Y
54
LG/Y
C701
B
A
DN
D1
MAIN LIGHT SWITCH
SEE PAGE 142 FOR SWITCH TERMINALS
DOME
HEAD
OFF
HEAD
PARK
HEAD
OFF
OFF
H
PARK
R
IGN
D2
C701
15
R/Y
14
BR
14
BR
19
LB/R
137
Y/BK
55
BK/PK
HEADLAMPS PAGE 62
EXTERIOR LAMPS PAGE 66
"LAMPS ON" WARNING PAGE 76, 77
D
TO FUSE PANEL PAGE 24
FROM FUSE PANEL PAGE 24
TO COURTESY LAMPS PAGE 76, 77
COURTESY/DOME CARGO LAMPS/ "LAMPS ON" INDICATOR PAGE 76-77

CHARGE/POWER DISTRIBUTION (DIESEL)



HOW THE CIRCUIT WORKS

The **Batteries, Alternator** and **Voltage Regulator** make up the **Diesel Charging System.**

With the **Ignition Switch** in RUN, **Battery** current flows through the solid-state Electronic Control of the **Voltage Regulator.** The Electronic Control applies **Battery** voltage to the **Alternator** field.

With current in the field and the rotor turning, the **Alternator** stator produces a DC voltage at B+ terminals (to **Battery**).

If the alternator output voltage is greater than the battery voltage, current will flow from the alternator to the Battery as well as to the vehicle electrical load.

If the alternator voltage is less than the battery voltage, current will flow from the battery to help supply the vehicle load.

TROUBLESHOOTING HINTS

IMPROPER CHARGING

The most common charge system complaints are dead **Battery** and charge indicator **On** at normal speed.

- Check **Fuse Link J** at **Starter Relay.**
- Check **Alternator** belt tension.
- Check **Battery** terminals and cable clamps.
- Check for clean and tight connections on **Alternator** and **Starter Relay.**

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Charge Indicator	In instrument cluster			
Fuse Links B, C, F, G, J, L, M, W	Near starter relay			
Fuse Links U, V	RH fender apron			
Glow Controller	On rear of engine	43-1		
Radio Noise Capacitor	Near voltage regulator			
Starter Relay	RH fender apron			
Connector C100	LH thru dash			53
Connector C129	RH fender apron	43-1	GY	8
Connector C187	At alternator regulator	44-2	W	4
Connector C188	At alternator	44-2		2
Connector C208B	To instrument cluster			14
Connector C280	RH fender apron		GY/W	1
Connector C701	At main light switch		BK	8
Ground G111	RH frame, near battery	26-2		
Ground G155	LH rear of engine	51-1		
Ground G156	Center of dash panel			
Ground G203	RH side of engine	26-1		
Ground G1201	Front LH side of engine	26-1		
Splice S203	Near fuse link "J"			
Splice S208	Near main light switch T/O			
Splice S216	Near steering column connector T/O			
Splice S220	Near LH courtesy lamp T/O			
Splice S303	Near windshield washer switch T/O			
Splice S401	Near steering column connector T/O			
Splice S541	Near diesel engine connector T/O			

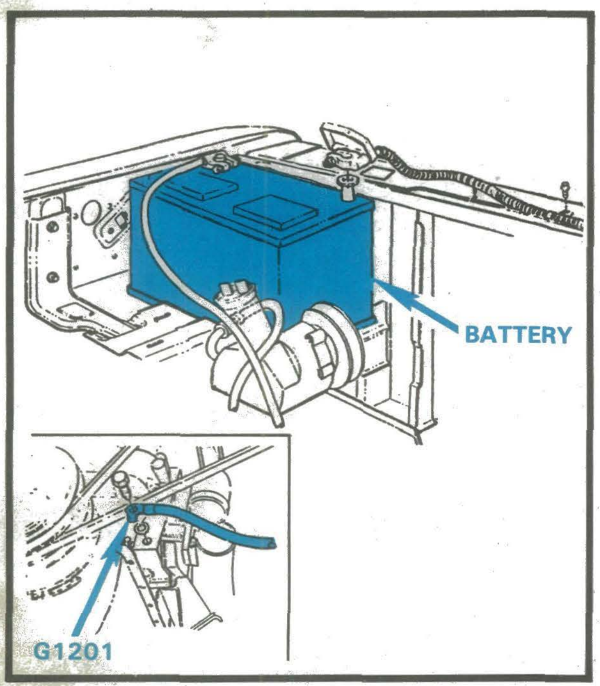


Figure 1 – Battery Wiring LH Side (Diesel Engine)

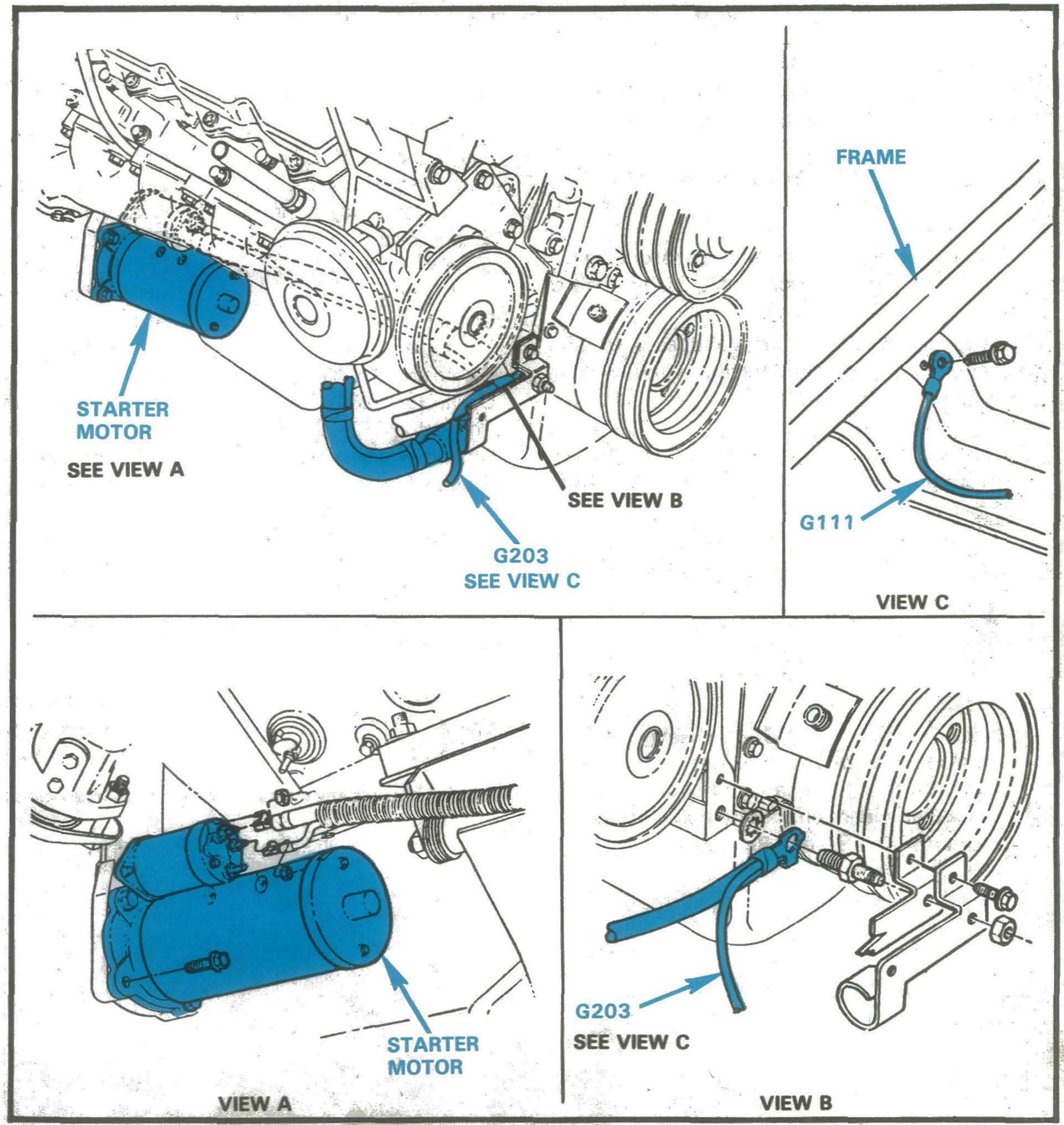
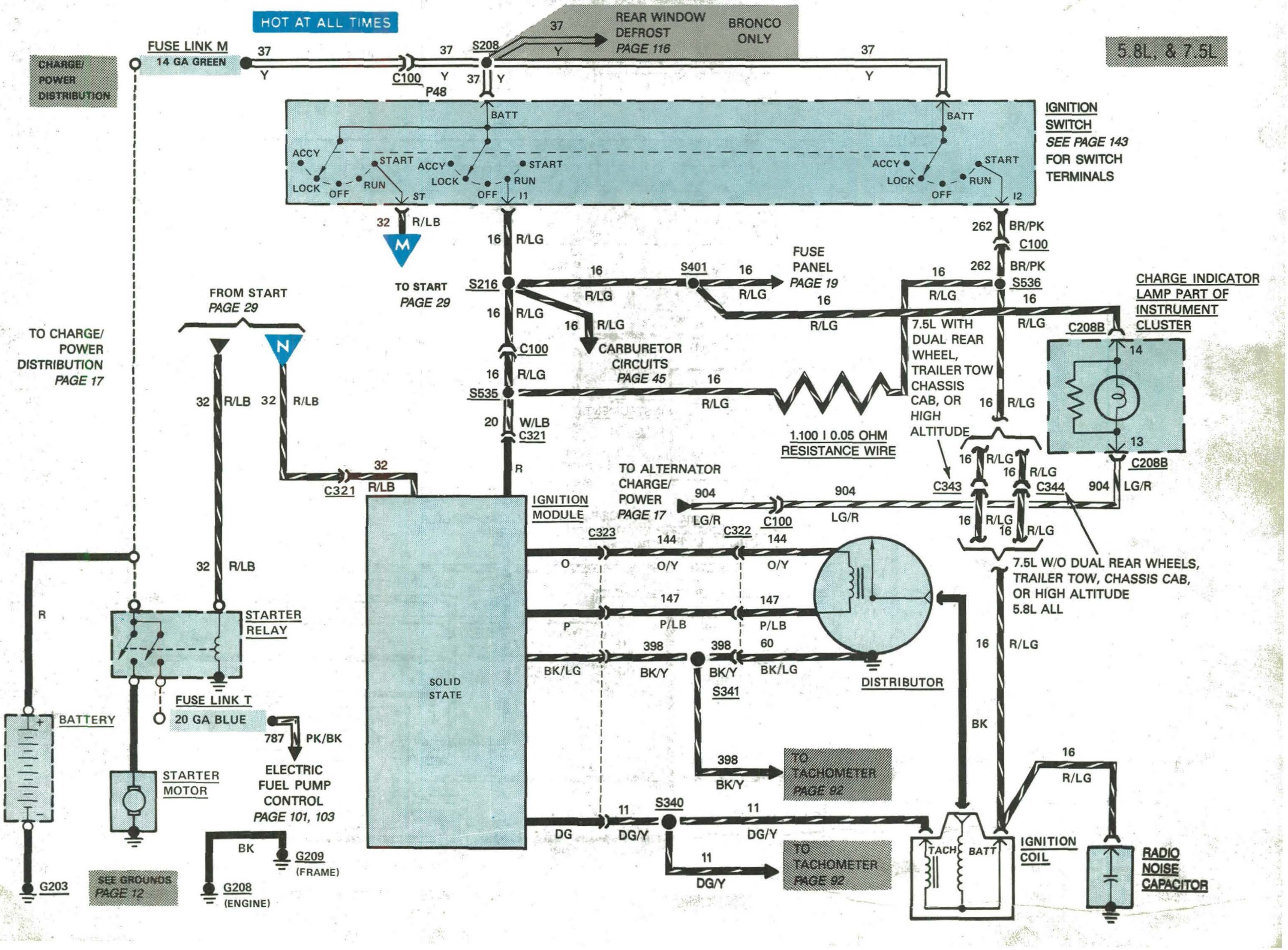
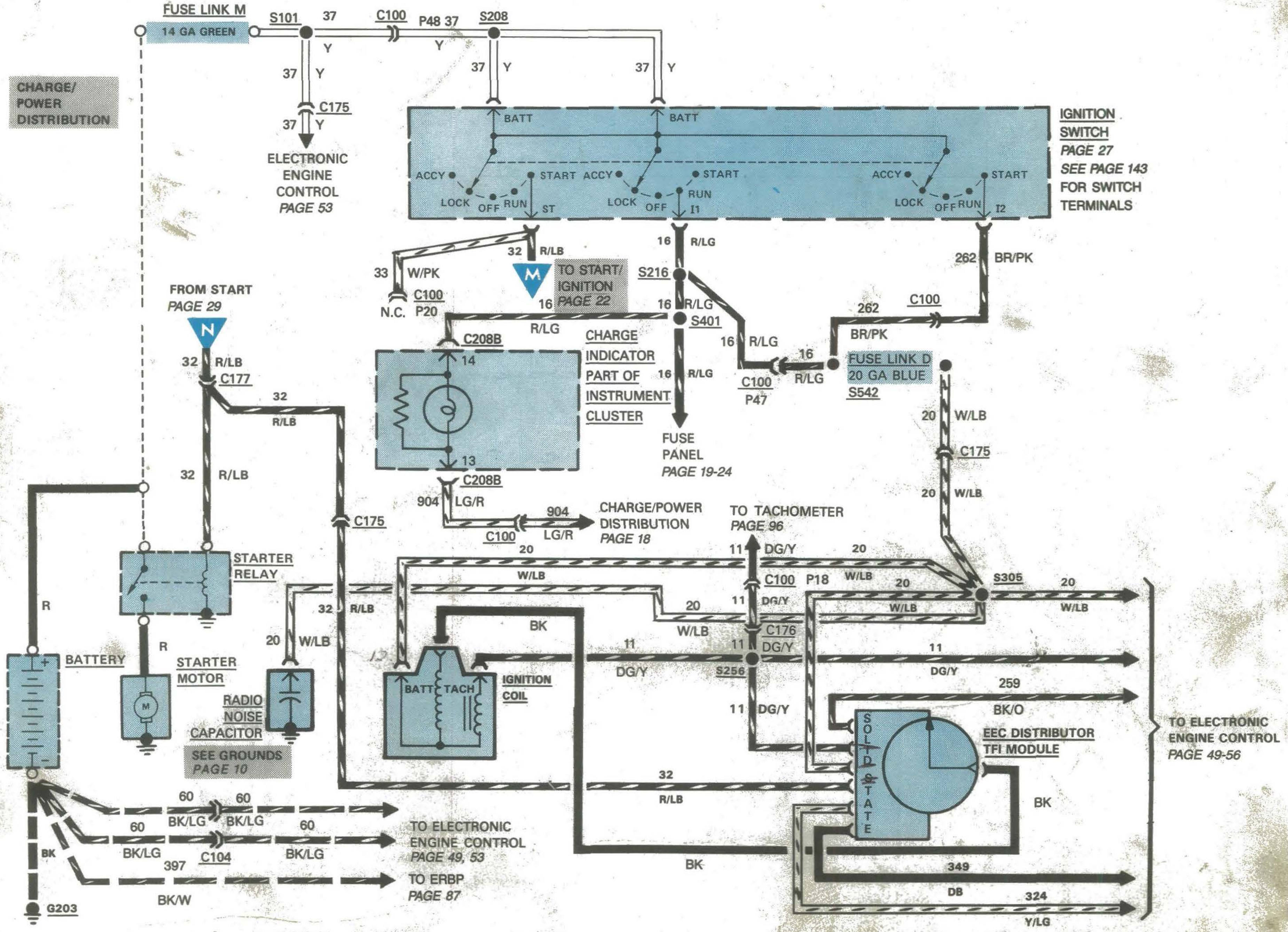


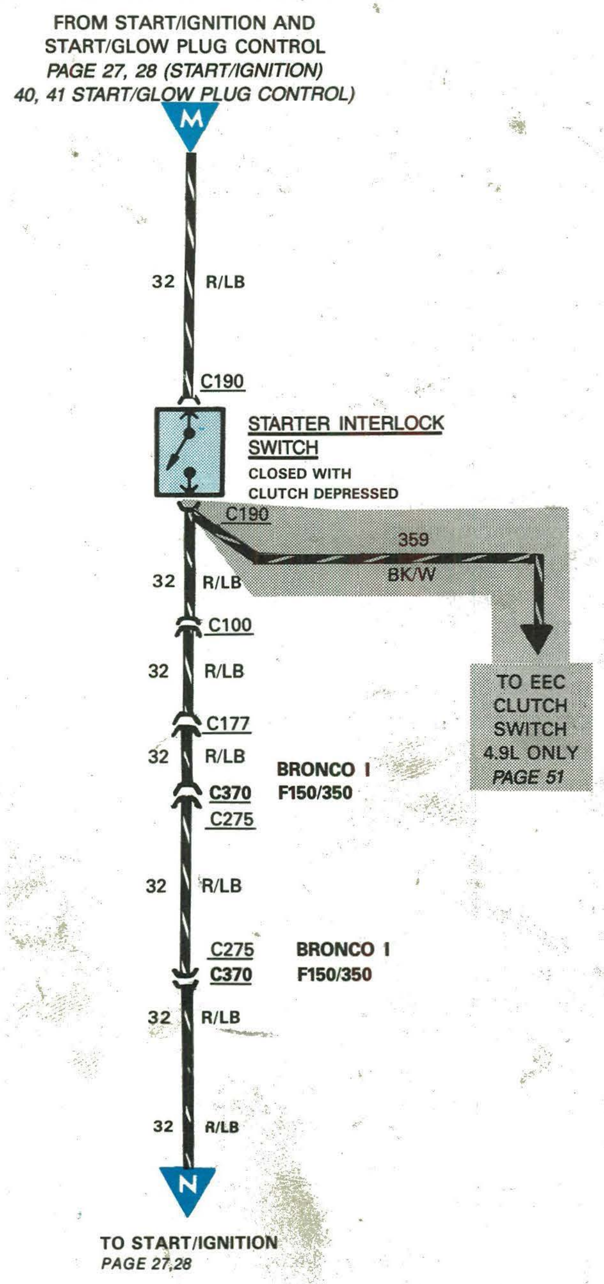
Figure 2 – Starter Wiring (Diesel Engine)


HOT AT ALL TIMES
5.8L, & 7.5L
CHARGE/ POWER DISTRIBUTION
FUSE LINK M
14 GA GREEN
37
Y
C100
P48
S208
REAR WINDOW DEFROST PAGE 116
BRONCO ONLY
BATT
IGNITION SWITCH
SEE PAGE 143 FOR SWITCH TERMINALS
ACCY
LOCK
OFF
RUN
START
ST
I1
I2
32
R/LB
M
TO START PAGE 29
16
R/LG
262
BR/PK
S216
S401
FUSE PANEL PAGE 19
S536
CHARGE INDICATOR LAMP PART OF INSTRUMENT CLUSTER
C208B
14
13
CARBURETOR CIRCUITS PAGE 45
7.5L WITH DUAL REAR WHEEL, TRAILER TOW CHASSIS CAB, OR HIGH ALTITUDE
1.100 I 0.05 OHM RESISTANCE WIRE
FROM START PAGE 29
N
TO CHARGE/ POWER DISTRIBUTION PAGE 17
S535
20
W/LB
C321
R
IGNITION MODULE
TO ALTERNATOR CHARGE/ POWER PAGE 17
904
LG/R
C343
C344
C323
C322
144
O
O/Y
147
P
P/LB
398
60
BK/LG
BK/Y
S341
DISTRIBUTOR
7.5L W/O DUAL REAR WHEELS, TRAILER TOW, CHASSIS CAB, OR HIGH ALTITUDE 5.8L ALL
STARTER RELAY
BATTERY
FUSE LINK T
20 GA BLUE
787
PK/BK
ELECTRIC FUEL PUMP CONTROL PAGE 101, 103
STARTER MOTOR
SOLID STATE
TO TACHOMETER PAGE 92
BK
11
S340
DG
DG/Y
IGNITION COIL
TACH
RADIO NOISE CAPACITOR
G203
SEE GROUNDS PAGE 12
G208 (ENGINE)
G209 (FRAME)

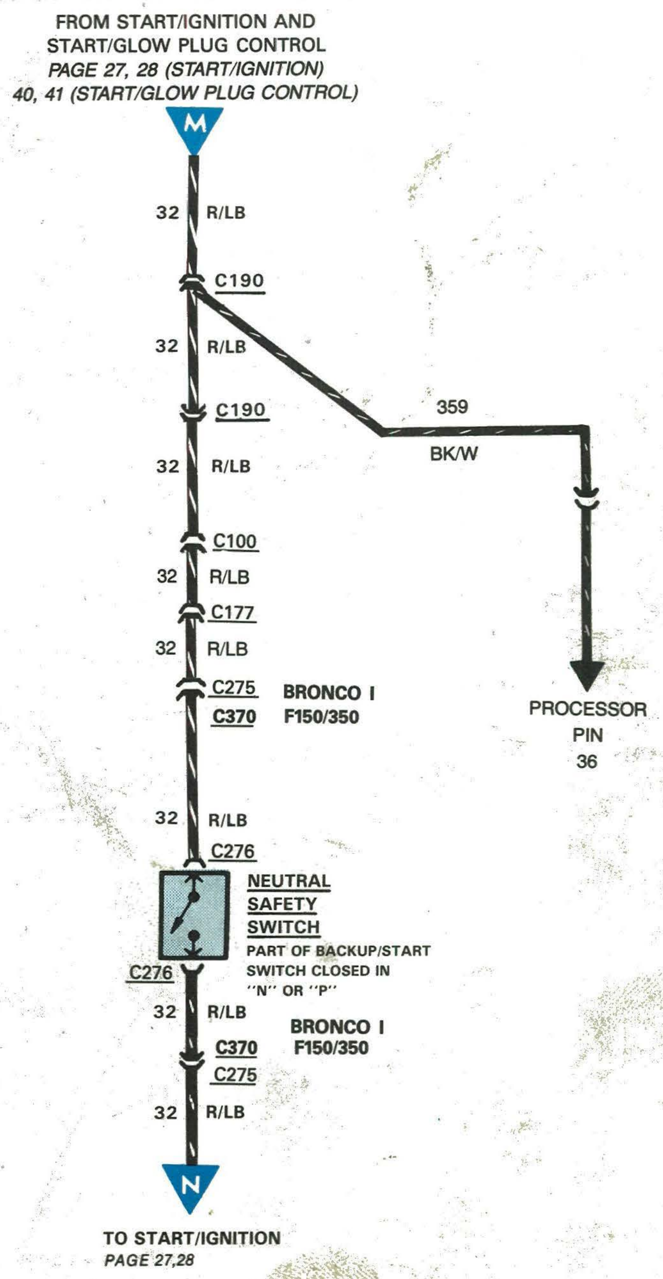
START/IGNITION (EEC) (4.9L AND 5.0L)



WITH MANUAL TRANSMISSION



WITH AUTOMATIC TRANSMISSION



START

HOW THE CIRCUIT WORKS

The **Battery, Starter Motor, Starter Relay, and Ignition Switch** make up the **Starting System.**

Turning the **Ignition Switch** to START sends current through the **Starter Relay** coil and operates the relay. Current from the **Battery** then flows directly through the **Starter Relay** to the **Starter Motor** to start the engine.

When the **Ignition Switch** is in START, **Battery** voltage is applied to the START (white) wire of the **Ignition Module** by way of circuit 33. Full voltage is applied to the BATT terminal of the **Ignition Coil.** After the engine has started, **Ignition Coil** voltage is reduced through the **1.1 Ohm Resistance Wire.**

TROUBLESHOOTING HINTS

CHECK BATTERY AND CABLES

- Check condition of **Battery.** Recharge or replace if necessary.
- Check **Battery** posts and attached cable lugs. Clean if necessary.
- Check cable terminals at **Starter Relay,** engine ground, and **Starter Motor** and clean if necessary. Make sure cable wire strands are securely attached in terminals. Cables are tight when eyelet can't be easily turned by hand.

IF STARTER CRANKS SLOWLY

- Check **Battery** and cables (see above).
- If still slow, repair or replace **Starter Motor.**

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Charge Indicator	Part of instrument cluster			
Clutch Lockout Switch	Near top of clutch pedal	34-1		
Fuse Link M	At starter relay			
Fuse Link T	At starter relay			
Ignition Coil	On engine	36-3, 37-4, 39-9		
Ignition Module — Duraspark	LH fender apron			
Ignition Module — EEC IV	At distributor	36-3		
Neutral Safety Switch	Part of automatic transmission			
Radio Noise Capacitor	At ignition coil			
Starter Relay	RH fender apron			
Connector C100	LH thru dash			53
Connector C104	At battery ground pigtail			4
Connector C175	LH engine compartment			10
Connector C176	LH engine compartment			8
Connector C177	LH engine compartment		GY	12
Connector C190	AT clutch lockout switch	34-1	GY	2
Connector 208B	To instrument cluster			14
Connector C275	LH frame rail			8
Connector C276	Near automatic transmission			5
Connector C321	LH fender apron near ignition module		BK	3
Connector C322	At distributor		BK	3
Connector C323	At ignition module		BK	4
Connector C343	LH fender apron near ignition module		BK	8
Connector C344	LH fender apron near ignition module		BK	8
Connector C370	LH frame rail		GY	4
Ground G203	RH side of engine	21-1, 21-2		
Ground G208	Near throttle position solenoid	35-2		
Ground G209	Center of dash panel			
Splice S208	Near main light switch T/O			
Splice S216	Near steering column connector T/O			
Splice S401	Near steering column connector T/O			
Splice S535	Near choke relay T/O			
Splice S536	Near windshield wiper motor T/O			

IF STARTER RELAY CHATTERS OR DOESN'T CLICK (STARTER DOES NOT CRANK)

- Check **Battery** and cables (see above).
- Make sure **Starter Relay** brackets are grounded tightly.
- With **R/LB** wire removed from **Starter Relay,** and transmission in PARK or NEUTRAL, jumper this terminal on **Starter Relay** to main terminal (**Battery** connection). If **Starter Motor** works, relay is good. Check **Ignition Switch.** Check wiring to **Starter Relay** for open or dirty connectors. If this jumper doesn't operate **Starter Relay,** replace it.

IF STARTER DOES NOT CRANK AND STARTER RELAY CLICKS

- Clean and tighten cable connection to **Starter Motor** terminal and relay terminals. Check cable to **Starter Motor** for damage and make sure wire strands are secure in eyelets.
- If still bad, repair or replace **Starter Motor.**

IF STARTER SPINS (HUMMING NOISE) BUT DOES NOT CRANK ENGINE

- Remove **Starter Motor.** Repair or replace starter drive.
- Read "Testing" in Section 28-02 of Shop Manual for detailed Starting System tests.

IGNITION-DURASPARK

HOW THE CIRCUIT WORKS

The basic **Dura Spark Ignition System** contains the breakerless **Ignition Module,** the **Ignition Coil,** the **Distributor,** and the spark plugs and wires.

When the engine is cranking or running:

— The magnetic pickup in the **Distributor** sends pulses to the **Ignition Module** as each tooth of the rotor passes the pickup.

— The **Ignition Module** switches current on and off to the primary (TACH TEST) of the **Ignition Coil** according to the **Distributor** pulses;

— Each interruption of primary current makes the **Ignition Coil** secondary produce a high-voltage pulse of up to 40,000 volts;

— High voltage pulses are transmitted to the **Distributor,** which sends them to fire the spark plugs.

IGNITION-EEC IV

See Electronic Engine Control.

> CAUTION
>
> *In the Dura Spark II system, a high-voltage pulse is produced when the Ignition Switch is turned OFF.*

TROUBLESHOOTING HINTS

DURA SPARK SYSTEM

The following steps are intended only as quick checks to identify and locate some of the more frequent problems. If these checks do not solve the problem, refer to the **Ignition System** diagnosis procedures in the proper Shop Manual for complete system tests.

If the **Ignition System** is OK, check the fuel system and the engine itself.

PRELIMINARY CHECKS

a. Check **Battery** for state of charge and for clean, tight battery terminal connections.

b. Inspect all wires and connectors for breaks, cuts, abrasions or burned spots. Repair or replace as necessary. Make sure all wires are connected correctly.

c. Unplug all connectors and inspect for corroded or burned contacts. Repair as necessary and plug connectors back together. Do NOT remove grease in connectors.

d. Check for loose or damaged spark plug or coil wires. If boots or nipples are removed on 8mm ignition wires, reline inside of each with new silicone di-electric compound.

SPECIAL TEST JUMPER

Make up a test jumper as shown in Figure 1 below. It is important to use only this test jumper when making these checks. Solid wire jumpers will not work for the quick checks.

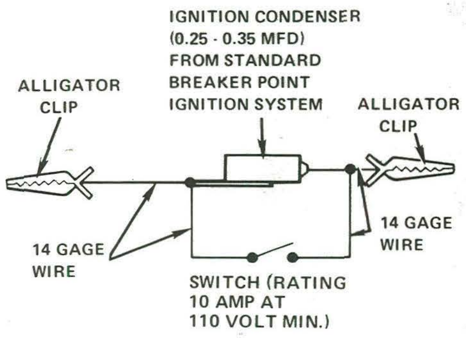

IGNITION CONDENSER (0.25 - 0.35 MFD) FROM STANDARD BREAKER POINT IGNITION SYSTEM
ALLIGATOR CLIP
ALLIGATOR CLIP
14 GAGE WIRE
14 GAGE WIRE
SWITCH (RATING 10 AMP AT 110 VOLT MIN.)

Figure 1 - Ignition Test Jumper

RUN MODE SPARK TEST

Step 1

a. Remove **Distributor** cap and rotor from **Distributor.**

b. Crank engine to align one tooth of armature (Figure 2) with magnet in pick-up coil (ignition OFF). Use a bump switch, or briefly touch a jumper between the **R** and **R/LB** terminals of the **Starter Relay.**

c. Remove coil (center) wire from **Distributor** cap. Install modified spark plug (side electrode removed) in coil wire terminal.

d. Turn **Ignition Switch** to RUN.

e. Hold side of spark plug against engine block using *insulated pliers. Tap base of* **Distributor** with screwdriver handle and watch for *SPARK* at the spark plug.

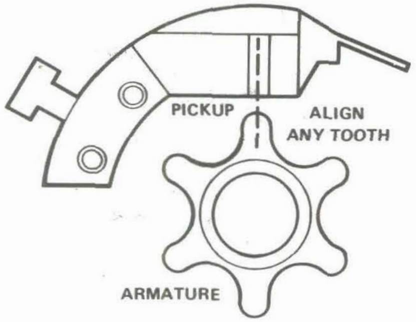


Figure 2 - Align Armature to Pickup

- — If there is a good *SPARK*, primary circuit is OK. Skip to "START MODE SPARK TEST" below.
- — If *NO GOOD SPARK*, perform **Step 2**.

Step 2

a. Unplug **C323** (4-wire connector) at **Ignition Module.**

b. In the harness side of the connector, connect the special test jumper (Figure 1) between the **BK/LG** and **DG/Y** leads. Use paper clips on connector socket holes to make contact.

c. With the **Ignition Switch** in RUN, close the test jumper switch. Leave closed for about one second, then open. Repeat this several times. There should be a *SPARK* each time this switch is opened.

- — If there is *NO SPARK*, the problem is in the primary circuit — the **Ignition Switch, Ignition Coil, DG/Y** lead, **BK/LG** lead, **R/LG** lead, or ground connection in the **Distributor.** Perform **Step 3.**
- — If there is *SPARK*, the primary circuit wiring and **Ignition Coil** are OK. The problem is in the **Distributor** pick-up, the **Ignition Module** bias power feed (**R** wire), or the **Ignition Module.** Perform **Step 6.**

Step 3

a. *Disconnect the test jumper lead from the* **BK/LG** lead and connect to a good ground on the engine. Turn the test jumper switch ON and OFF several times as in **Step 2.**

- — If there is *NO SPARK*, the problem is in **the DG/Y** lead, the **Ignition Coil,** or the coil feed circuit. Perform **Step 5.**
- — If there is *SPARK*, the problem is in the **BK/LG** lead or the ground connection in the **Distributor.** Perform **Step 4.**

Step 4

a. Connect an ohmmeter between the **BK/LG** lead and a good ground on the engine. With the meter on its lowest scale there should be no measurable resistance in the circuit.

- — If there is *RESISTANCE*, check ground connection in **Distributor** and **BK/LG** *lead from module. Repair or replace as* necessary. Remove meter plug in all connectors and repeat **Step 1.**
- — If there is *NO RESISTANCE*, the primary ground wiring is OK. Perform **Step 6.**

Step 5

a. Disconnect the test jumper from the **DG/Y** lead and ground and connect it between the **Tach-Test** terminal of the coil and a good ground on the engine.

b. With the **Ignition Switch** in RUN, turn the jumper switch ON. Hold it ON for approximately one second and turn it OFF as in **Step 2.** Repeat this several times. There should be a *SPARK* each time the switch is turned OFF.

- — If there is *NO SPARK*, the problem is in the coil or in the primary circuit through the **Ignition Switch** to the coil BATT terminal.
  - Check coil for internal shorts or opens and for primary resistance (1.13 to 1.23 ohm) and secondary resistance (**R/LG** wire) (7.7 to 9.3 K ohms). Replace coil if necessary.
  - Check coil feed circuit for opens, shorts, or high resistance. Repair as necessary. Remove test jumper, plug in connectors, and repeat **Step 1.**
- — If there is *SPARK*, the coil and its feed circuit are OK. The problem is in the **DG/Y** lead between the coil and the module. Check for open or short and repair as necessary. Remove test jumper, plug in all connectors, and repeat **Step 1**

Step 6

a. Connect a voltmeter between the **O/Y** and **P/LB** leads on the harness side of the module 4-wire connector.

CAUTION

If the vehicle has a catalytic converter, disconnect the air supply line between the Bypass Valve and the Manifold before cranking the engine with the Ignition Switch in OFF. This will prevent damage to the catalytic converter.

After testing, run the engine for at least 3 minutes before reconnecting the air supply line to clear excess fuel from the exhaust system.

NOTE

Do not use a voltmeter which is combined with a dwell-meter. Slight needle oscillations (½ volt) may not be detectable on this type of test unit.

b. Set meter on its lowest scale and crank the engine. Meter needle should oscillate slightly (approximately ½ volt).
   - If meter needle does *NOT OSCILLATE,* check circuit through magnetic pick-up (in **Distributor**) for open, shorts, shorts to ground, and resistance. Resistance between **O/Y** and **P/LB** leads should be 400—1000 ohms and between each lead and ground should be more than 70K ohms. Repair as necessary, plug in all connectors, and repeat **Step 1.**
   - If meter *OSCILLATES,* problem is in the power feed to the **Ignition Module (R** wire) or in the module itself. Perform **Step 7.**

Step 7

a. Remove all meters and jumpers. Plug in all connectors.

b. Turn the **Ignition Switch** to RUN and measure voltage to engine ground at:
   - **Battery** positive terminal. This reading should be at least 12 volts.
   - The **R** lead of the **Ignition Module.** Use a straight pin to pierce the insulation of the lead and connect voltmeter to pin (Figure 3).

c. These two readings should be within 1 volt of each other.
   - If readings are *NOT WITHIN ONE VOLT,* check circuit feeding power to **R** lead for shorts, open, or high resistance. Repair as necessary and repeat **Step 1.**
   - If readings are *WITHIN ONE VOLT,* the problem is probably in the module. Disconnect the module and connect a known-good module in its place and repeat **Step1.** If this corrects the problem reconnect the original module and recheck. If problem returns, remove the old module and install the new one.

START MODE SPARK TEST

Step 1

a. Remove coil wire from **Distributor** cap. Install modified spark plug (side electrode removed) in coil wire terminal.

CAUTION

Disconnect air supply line as in CAUTION note above.

b. Hold side of spark plug against engine block using insulated pliers. Have someone crank engine (**Ignition Switch** to START).
   - If there is a *GOOD SPARK,* the problem is in the **Distributor** cap, rotor, ignition cable(s), or spark plug(s).
   - If *NO GOOD SPARK,* proceed to **Step 2.**

Step 2

a. Measure **Battery** voltage, and voltage at **W** wire of the module while cranking engine. Use a straight pin to pierce the wire (Figure 3).

b. These two readings should be within 1 volt of each other.
   - **If readings are *NOT WITHIN ONE VOLT,* check and repair the feed through the Ignition Switch to the W wire (W/PK lead). Recheck for spark (Step 1).**
   - If readings *ARE WITHIN ONE VOLT,* or if there is still no spark after power feed to **W** wire is repaired, go on to **Step 3.**

Step 3

a. Measure coil BATT terminal voltage while cranking engine.

b. Reading should be within 1 volt of battery voltage.
   - If reading is *NOT WITHIN ONE VOLT,* check and repair the feed through the **Ignition Switch** to the coil (**BR/PK, R/LG** leads). Recheck for spark **(Step 1).**
   - If reading is *WITHIN ONE VOLT,* the problem is in the **Ignition Module.** Plug in a known-good module and recheck for spark (**Step 1**).

NOTE

If the above steps do not solve the problem, see "Engine Diagnosis and Service," section of Shop Manual.

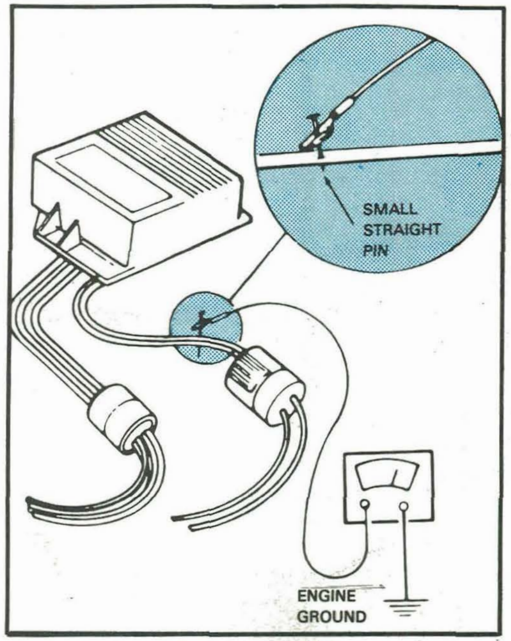


Figure 3 - Pin Test

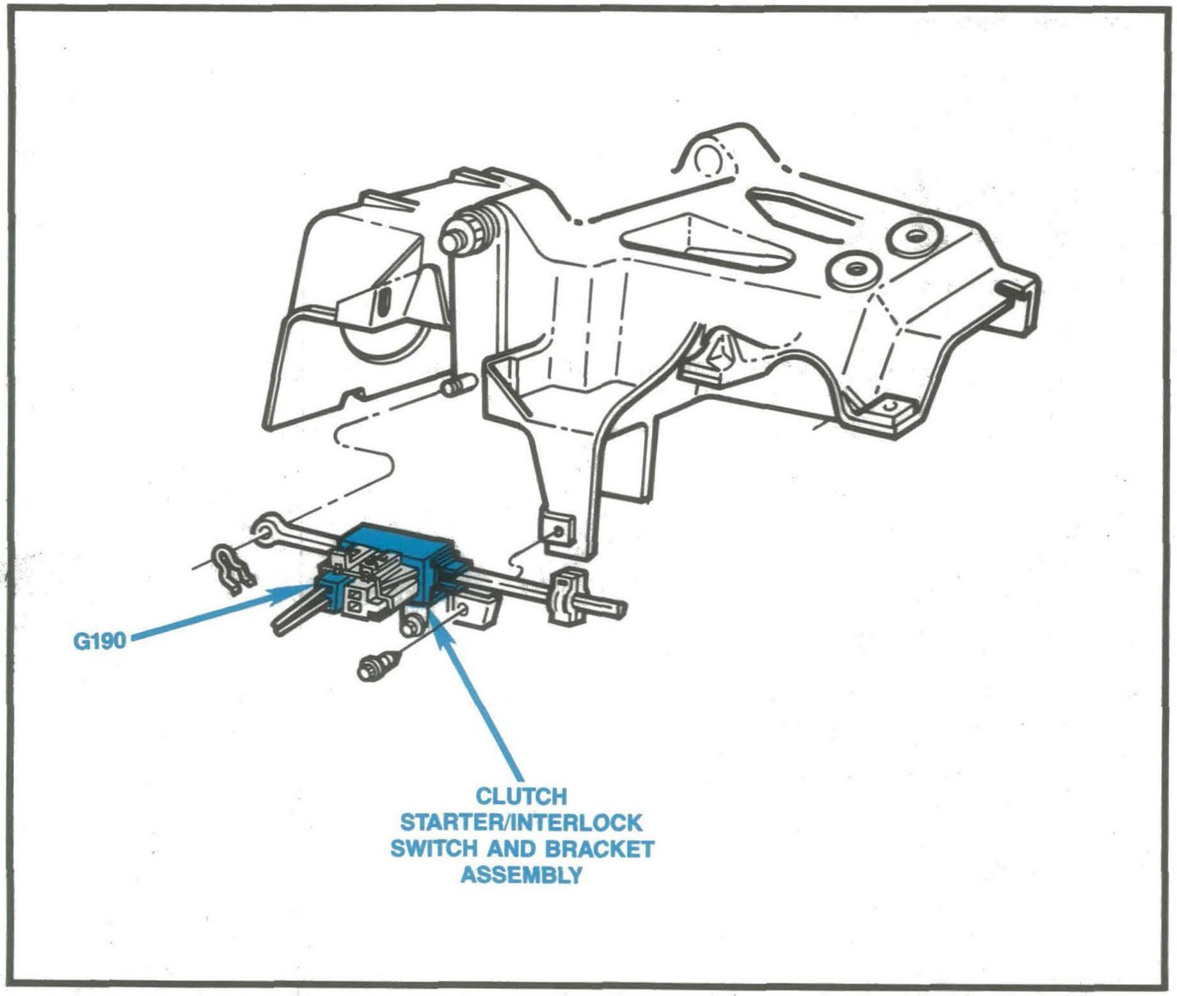


Figure 1 — Starter Interlock Switch

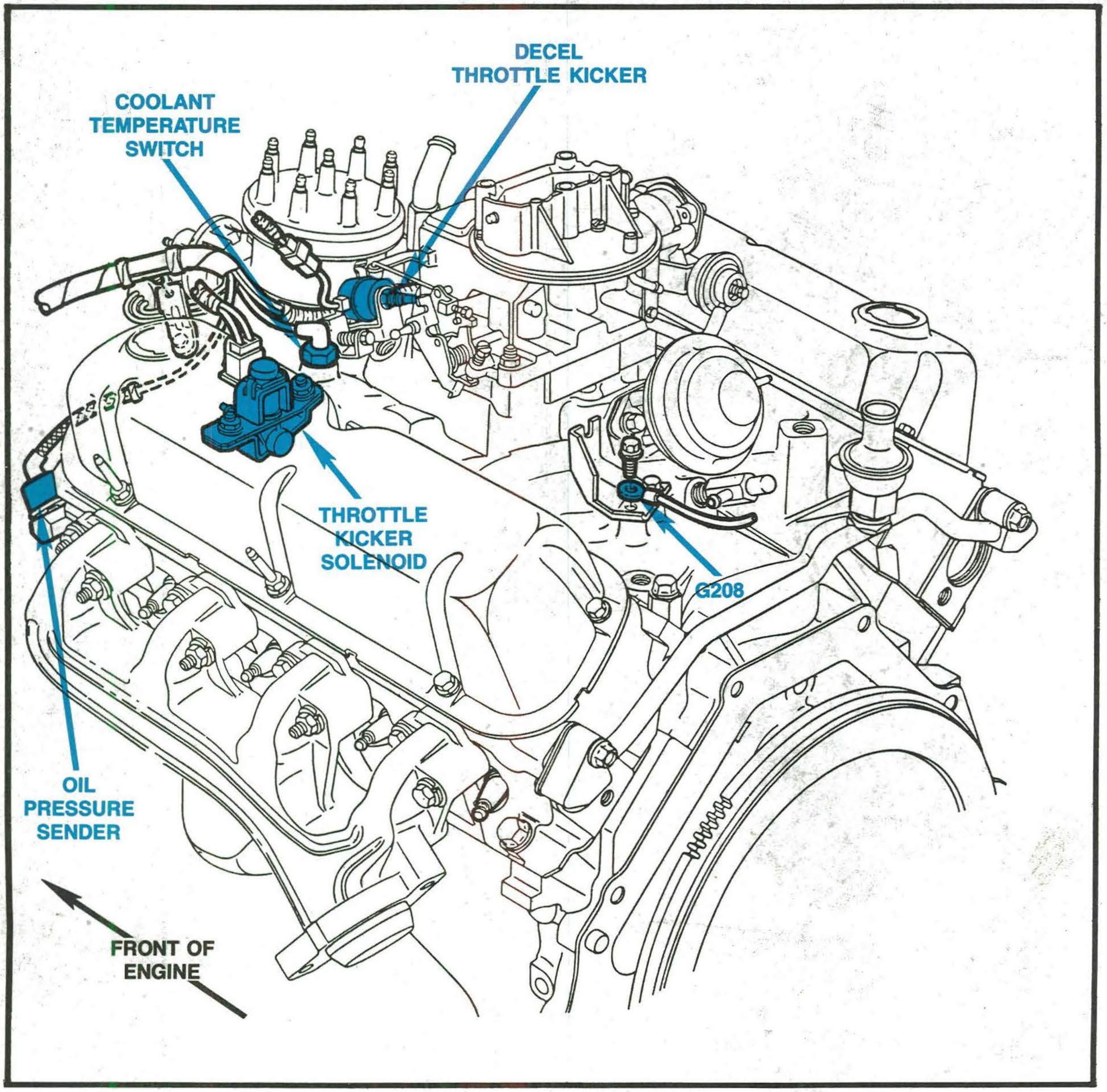
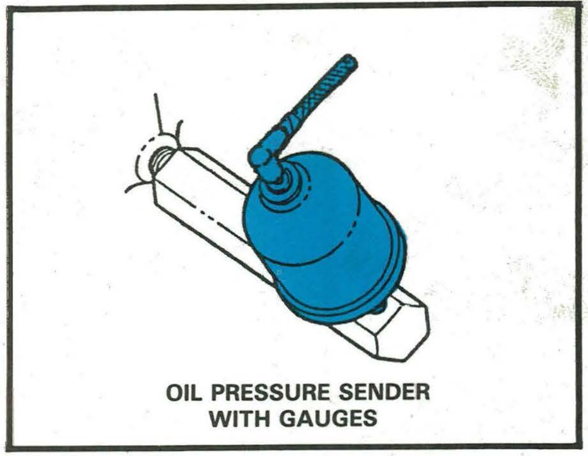


Figure 2—LH View 5.8L Engine 8 Cyl. 4V 49 States and Hi Altitude



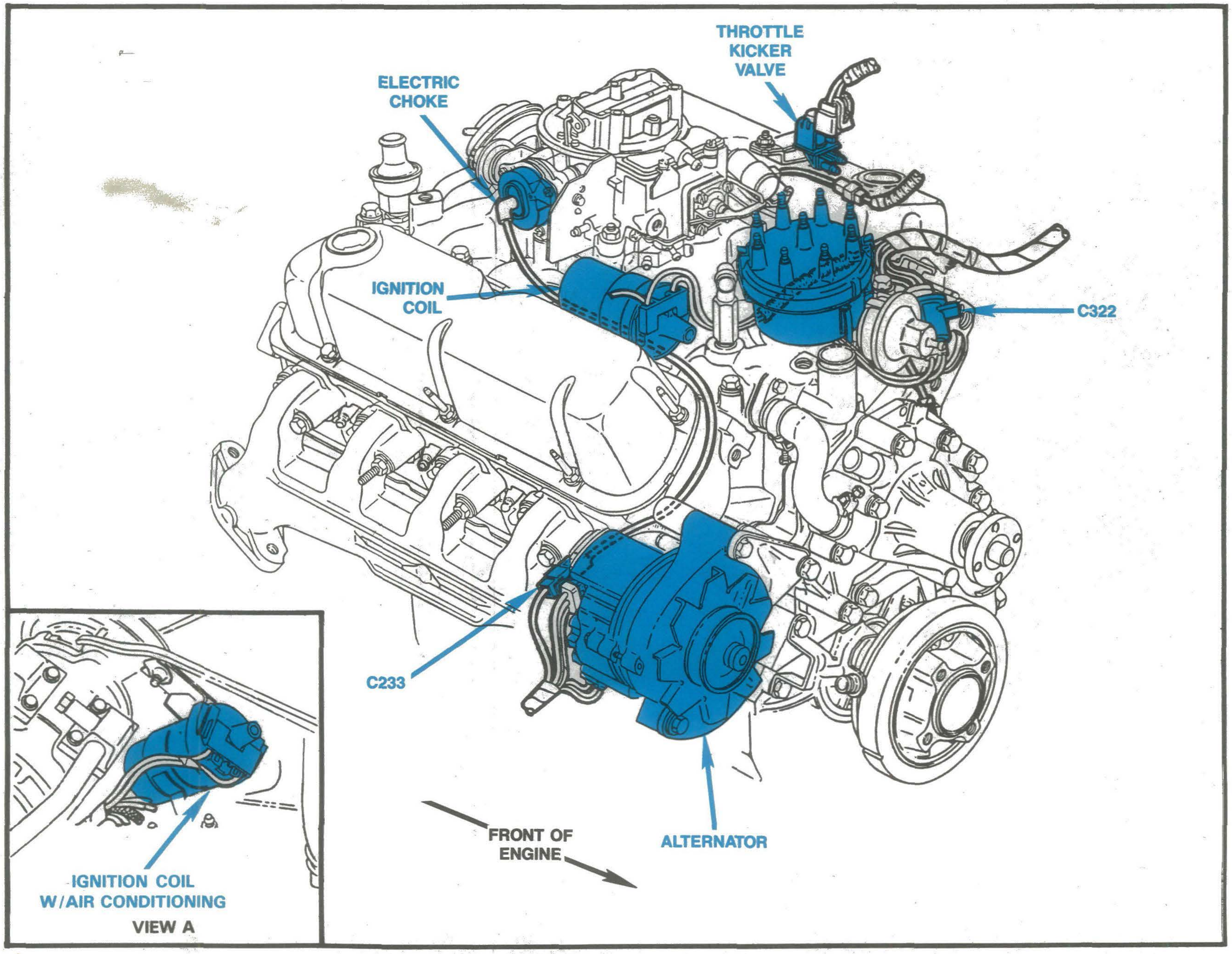


Figure 3 – RH View 5.8L Engine 8 Cyl. 4V (49 States and Hi Altitude)

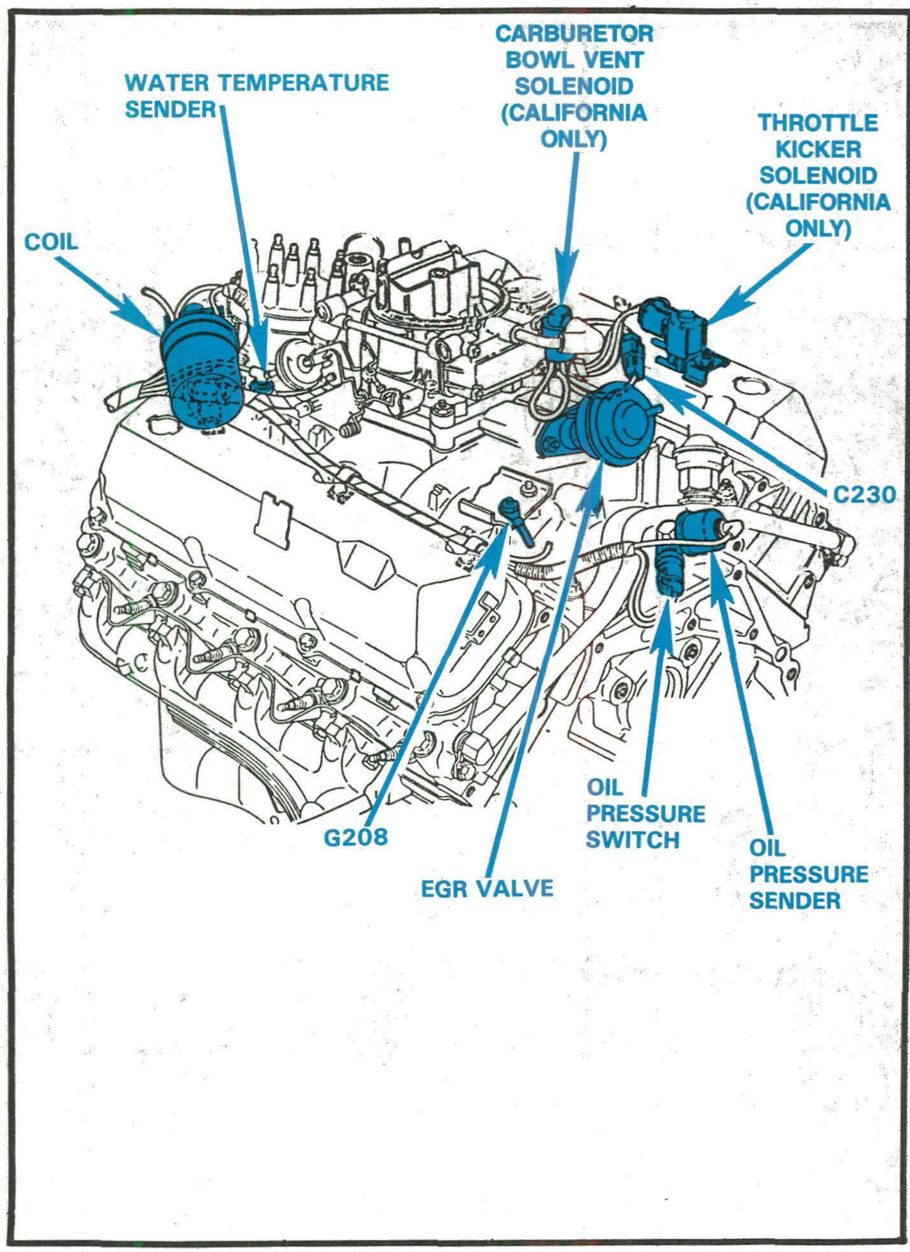

WATER TEMPERATURE SENDER
CARBURETOR BOWL VENT SOLENOID (CALIFORNIA ONLY)
THROTTLE KICKER SOLENOID (CALIFORNIA ONLY)
COIL
C230
G208
EGR VALVE
OIL PRESSURE SWITCH
OIL PRESSURE SENDER

Figure 4 – LH View 7.5L Engine (50 States)

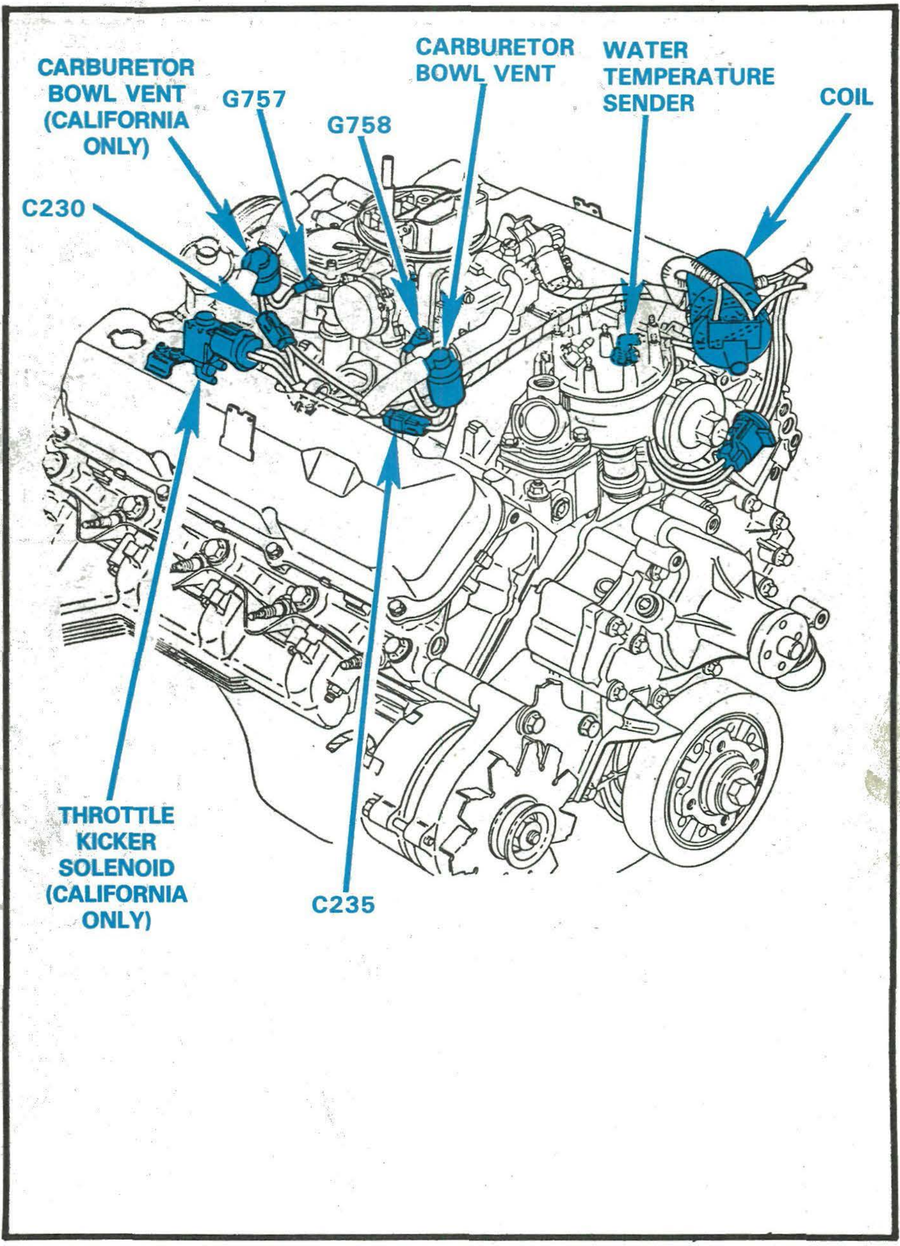

CARBURETOR BOWL VENT (CALIFORNIA ONLY)
G757
G758
CARBURETOR BOWL VENT
WATER TEMPERATURE SENDER
COIL
C230
THROTTLE KICKER SOLENOID (CALIFORNIA ONLY)
C235

Figure 5 – RH View 7.5L Engine (50 States) Automatic Transmission

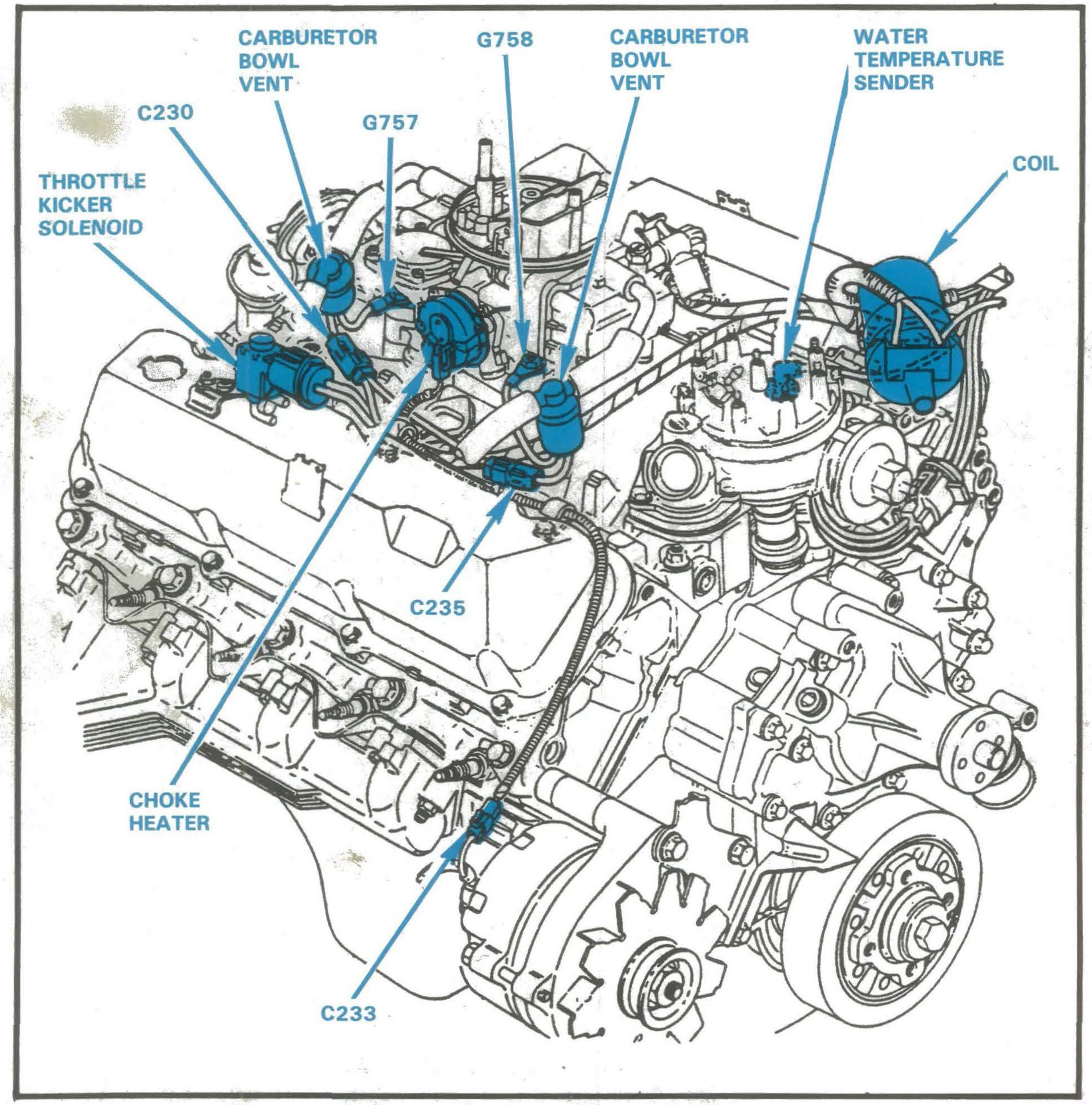


Figure 6 – RH View 7.5L Engine (50 States) Manual Transmission

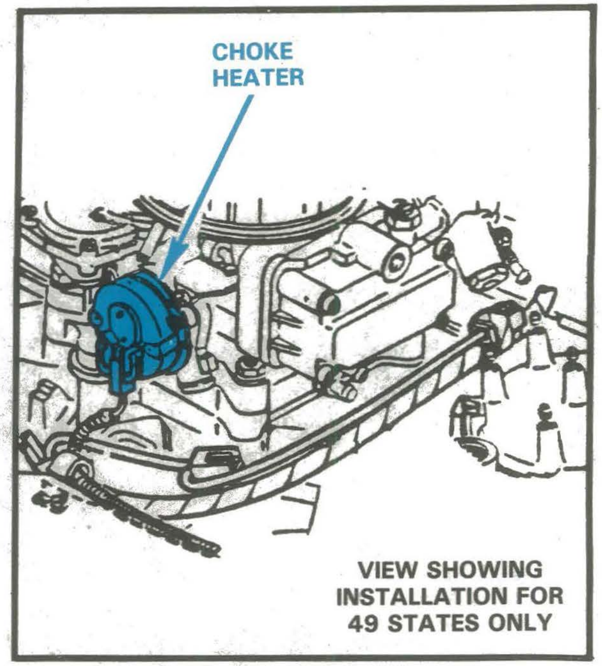


Figure 7 — RH View 7.5L Engine (49 States) Manual Transmission

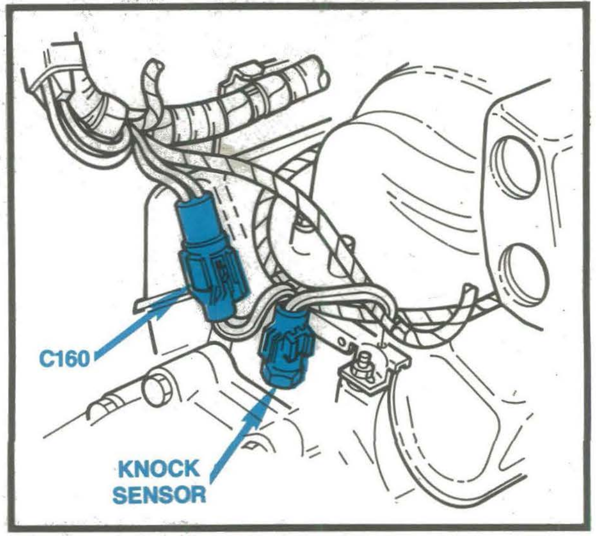


Figure 8 — Knock Sensor Location — 5.0L EFI

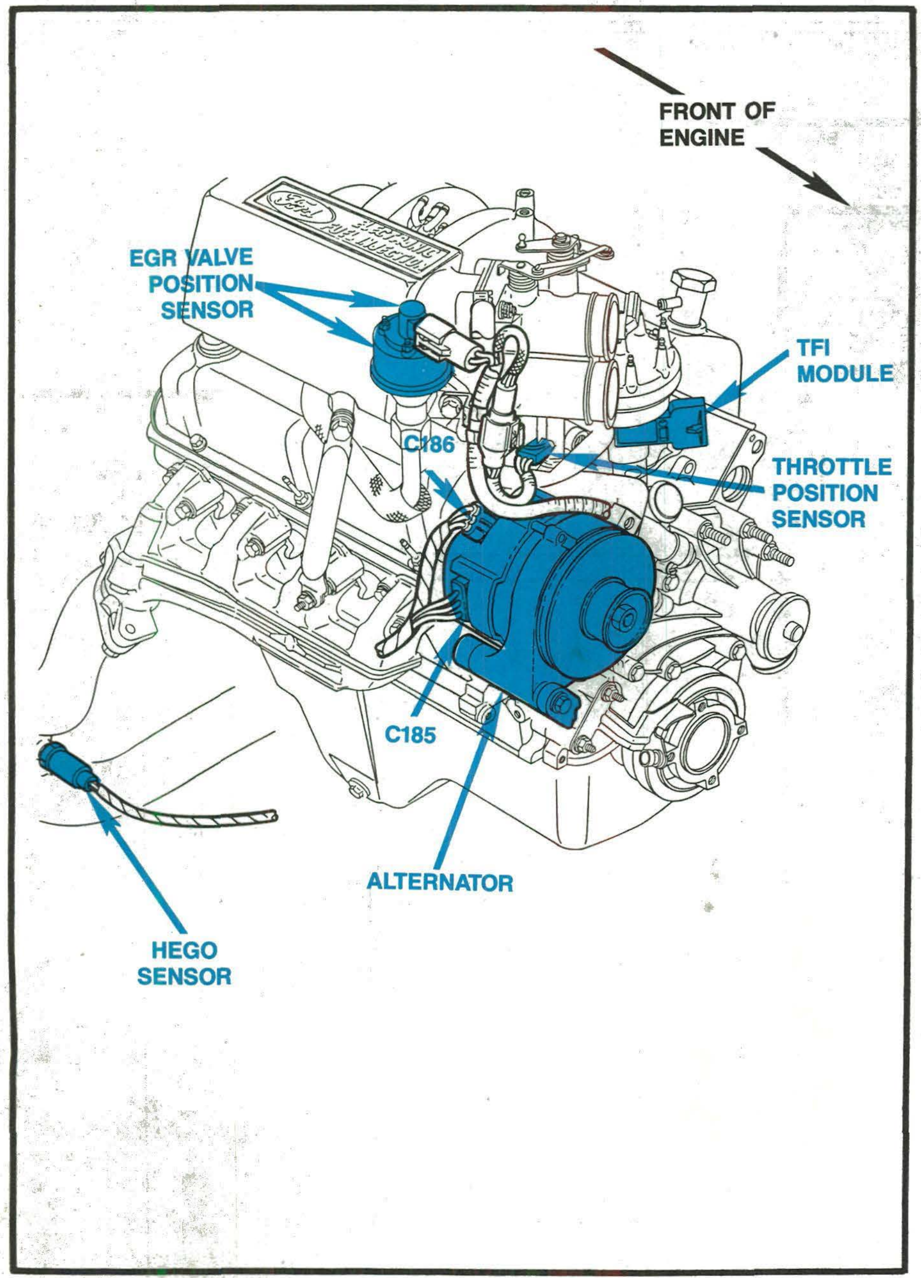


Figure 9 — RH View 5.0L Engine (50 States) (EEC-IV)

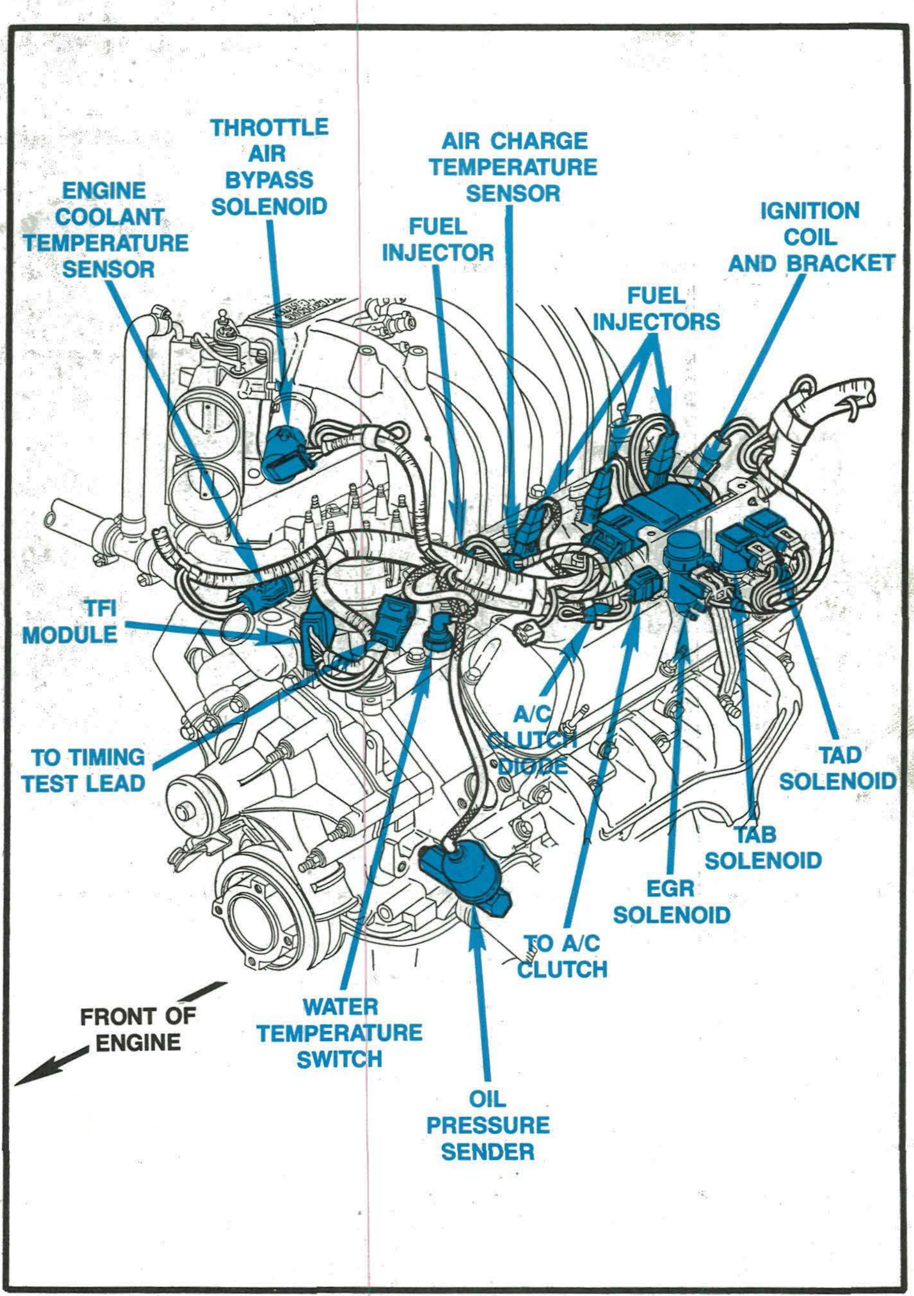
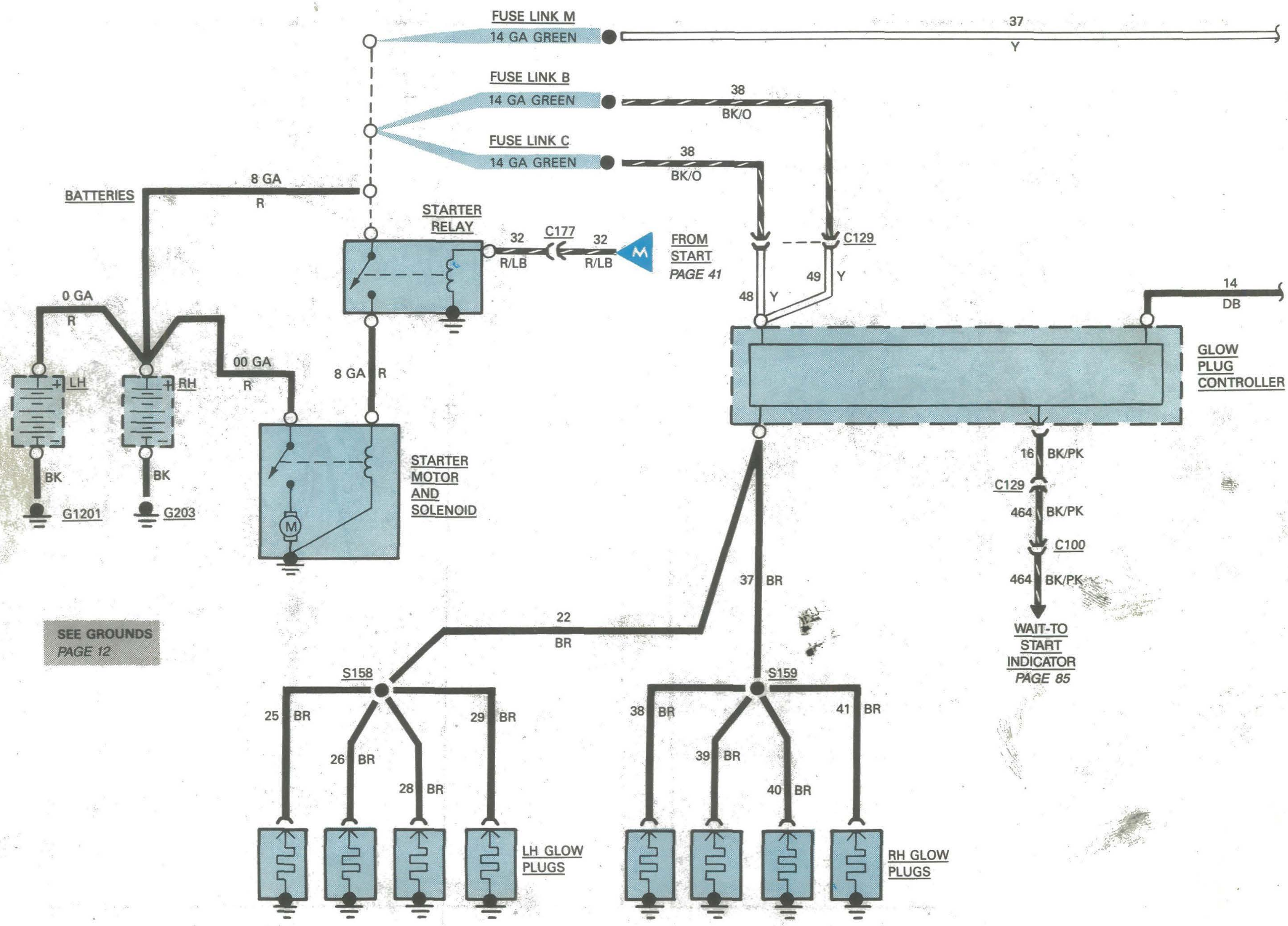
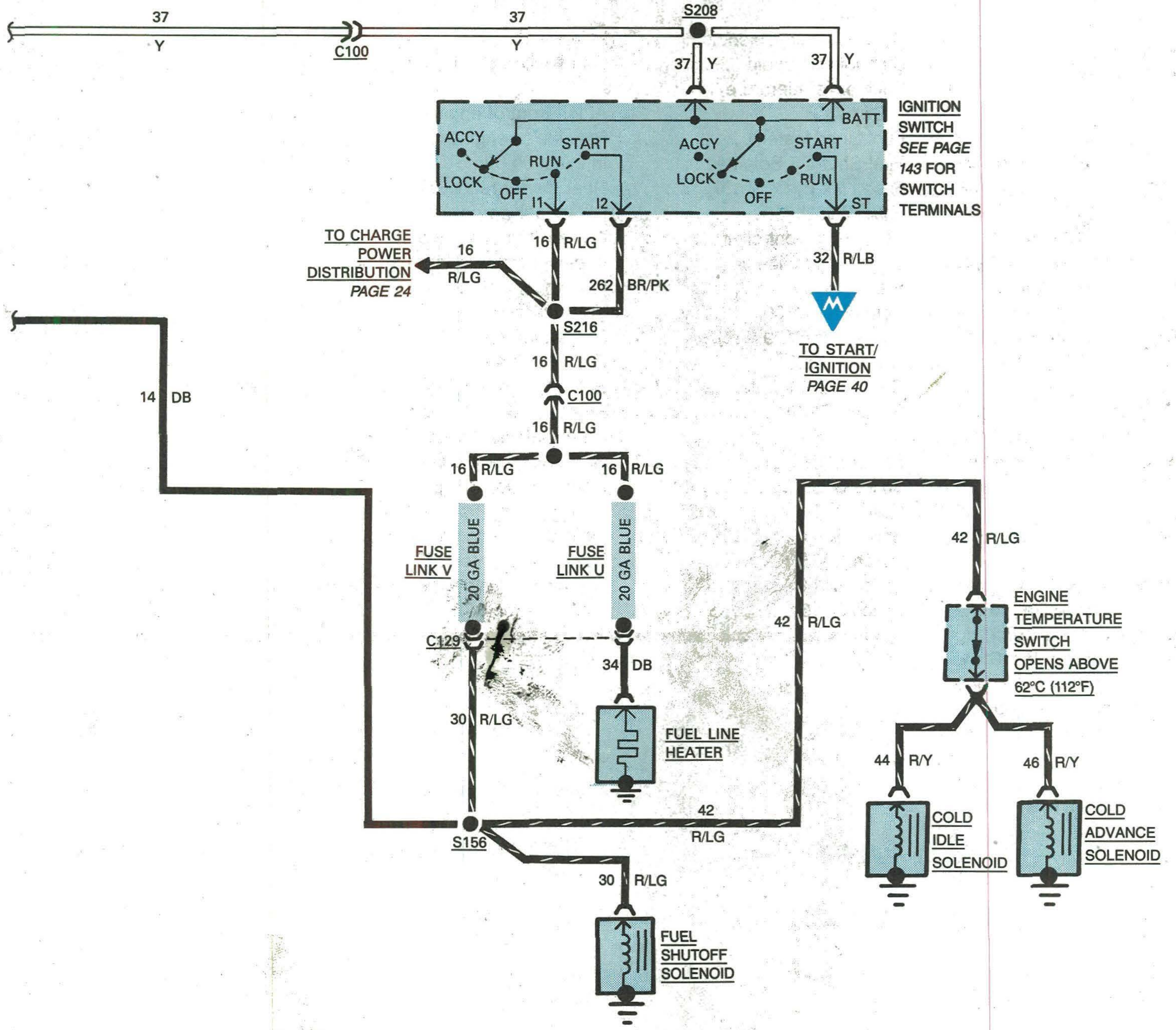


Figure 10 — LH View 5.0L Engine (50 States) (EEC-IV)

START/GLOW PLUG CONTROL/RUN (DIESEL)




37
Y
C100
37
Y
S208
37 Y
37 Y
IGNITION SWITCH SEE PAGE 143 FOR SWITCH TERMINALS
BATT
ACCY
START
RUN
LOCK
OFF
I1
I2
ACCY
START
LOCK
RUN
OFF
ST
TO CHARGE POWER DISTRIBUTION PAGE 24
16
R/LG
16 R/LG
262 BR/PK
32 R/LB
M
TO START/ IGNITION PAGE 40
S216
16 R/LG
C100
16 R/LG
14 DB
16 R/LG
16 R/LG
FUSE LINK V
20 GA BLUE
FUSE LINK U
20 GA BLUE
C129
34 DB
30 R/LG
FUEL LINE HEATER
42 R/LG
42 R/LG
ENGINE TEMPERATURE SWITCH OPENS ABOVE 62°C (112°F)
44 R/Y
46 R/Y
COLD IDLE SOLENOID
COLD ADVANCE SOLENOID
S156
42
R/LG
30 R/LG
FUEL SHUTOFF SOLENOID

HOW THE CIRCUIT WORKS

The Diesel Start/Glow Plug Control circuit applies power to the **Glow Plugs** which heat the combustion chambers, so that the cold diesel engine can be started.

Glow Plug Control

The solid state **Glow Plug Controller** is attached to the top of the engine block. It controls glow plug pre-glow after-glow time. The **Glow Plug Controller** controls the circuit's operation by sensing engine temperature, glow plug voltage, and after-glow voltage from start/run circuit.

When the **Ignition Switch** is turned to RUN, voltage from **Fuse Link V** is applied through the **Glow Plug Controller** to the **Glow Plugs Wait to Start Indicator Lamp.**

The glow plugs are heated from zero to fifteen seconds, depending on engine coolant temperature. After this time, the controller cycling switch opens and voltage to the **Glow Plugs Wait to Start Indicator Lamp.**

The **Glow Plugs** are now warm enough for the engine to be started.

At the same time the **Ignition Switch** is turned to Run, voltage from **Fuse Link V** is applied to the After-Glow Timer (located inside the Glow Plug Controller). The After-Glow Timer cycles the **Glow Plugs** for up to two minutes, depending on engine temperature. The After-Glow Timer then opens. The **Wait to Start Indicator Lamp** will not cycle during the After-Glow period.

If the ignition switch is turned **OFF,** it can be turned **ON** immediately and the **Glow Plug** heating cycle will start again.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Cold Advance Solenoid	In injection pump			
Cold Idle Solenoid	On injection pump			
Engine Temperature Switch	At left front of engine			
Fuel Line Heater	RH side of engine	44-1		
Fuel Shut-Off Solenoid	In injection pump			
Fuse Link B, C, M	Near starter relay			
Fuse Link U, V	RH fender apron			
Glow Plug Controller	LH rear top of engine	43-1		
Glow Plug Indicator	In diesel warning lamp module			
Starter Relay	RH fender apron			
Connector C100	LH thru dash			53
Connector C129	RH fender apron	43-1	GY	8
Ground G203	RH side of engine	26-1		
Ground G701	Behind I/P at center			
Ground G1201	Front LH side of engine	26-1		
Splice S156	Near fuel line heater			
Splice S158	Near LH glow plugs			
Splice S159	Near RH glow plugs			
Splice S216	Near steering column connector T/O			
Splice S541	Near diesel engine harness connector T/O			
Splice S805	Near cigar lighter T/O			
Splice S814	Near windshield wiper illumination lamp T/O			
Splice S815	Near ground G701 T/O			

Diesel Start/Run

The diesel engine uses two batteries to provide extra power for starting and glow plug heating. Power is applied from the batteries through heavy gauge wires to the Starter Solenoid in the Starter motor assembly. When the **Glow Plug Indicator** goes out, the **Ignition Switch** can be turned to START. With the transmission selector in park or neutral (automatic transmission), or the clutch pedal depressed (manual transmission), power is applied to the **Starter Relay.** The relay applies power to the solenoid coil which closes contacts to apply battery power to the starter motor.

With the **Ignition Switch** in Start or Run, voltage is supplied to the **Fuel Line Heater, Fuel Shut-Off Solenoid, Engine Temperature Switch, Cold Advance Solenoid,** and the **Cold Idle Solenoid,** through **Fuse Links U and V.**

The **Fuel Line Heater** is wrapped around the fuel line. It heats the diesel fuel to melt any wax which might clog the filter. The heater has an interval thermostat to turn it on as needed.

The **Fuel Shut-Off Solenoid** controls the flow of fuel into the Injection Pump. With the **Ignition Switch** in Start or Run, the solenoid is energized, and fuel is allowed to flow into the Injection Pump. When the **Ignition Switch** is turned Off, the solenoid is de-energized, fuel flow stops, and the engine stops running.

The **Engine Temperature Switch** provides voltage to the **Cold Advance Solenoid** and the **Cold Idle Solenoid.** When engine temperature is below 62°C (112°F), the **Engine Temperature Switch** is closed. When the **Ignition Switch** is turned to Start or Run, the Solenoids are energized, advancing Injection Pump timing and Engine Idle, allowing the engine to run more smoothly when cold. When the engine temperature reaches 62°C (112°F), the **Engine Temperature Switch** opens. This de-energizes the Solenoids, returning the Timing and Idle to normal.

TROUBLESHOOTING HINTS

See the Engine/Emission Diagnosis Manual.

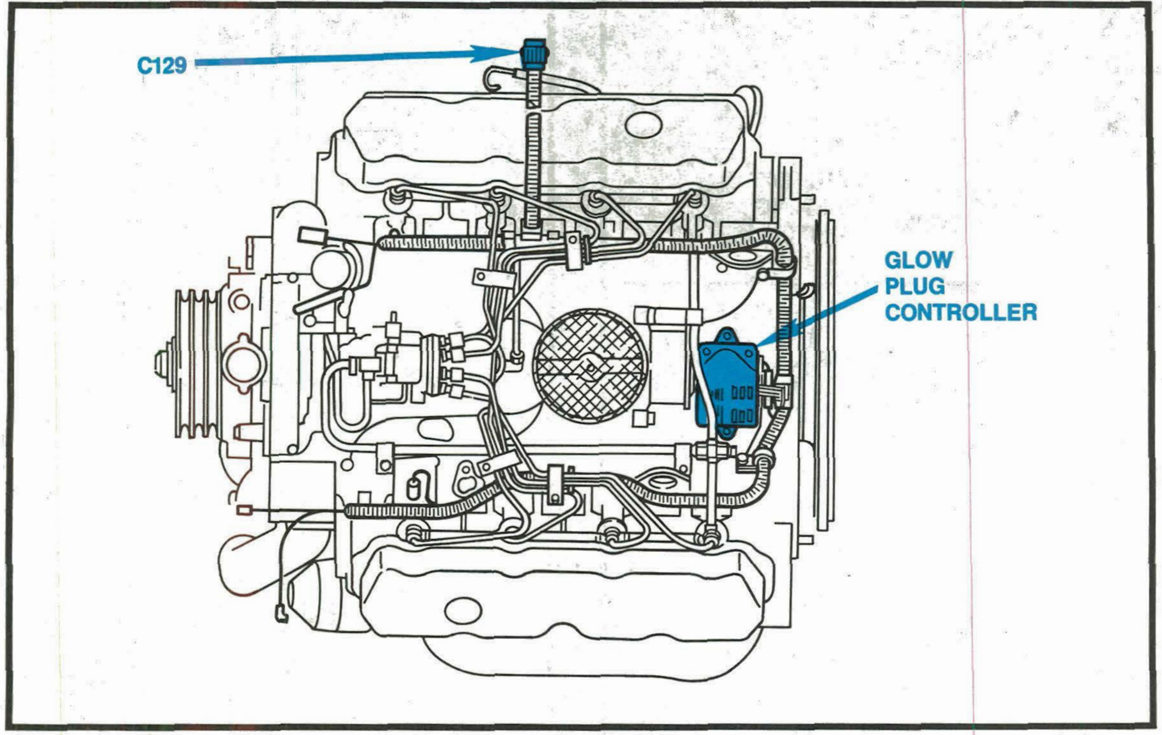


Figure 1 — Glow Plug Controller

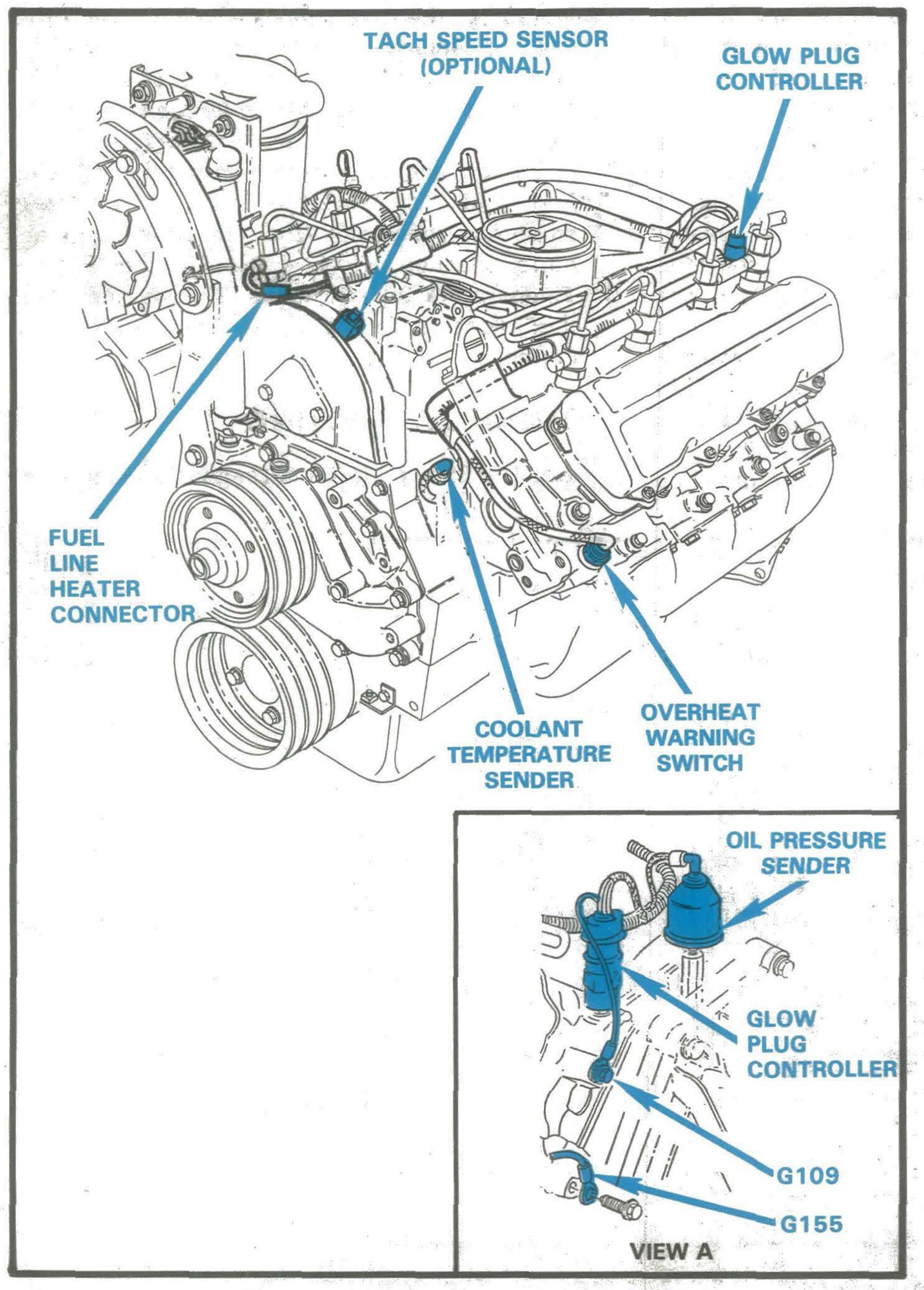


Figure 2 — LH Side of 6.9L Diesel Engine

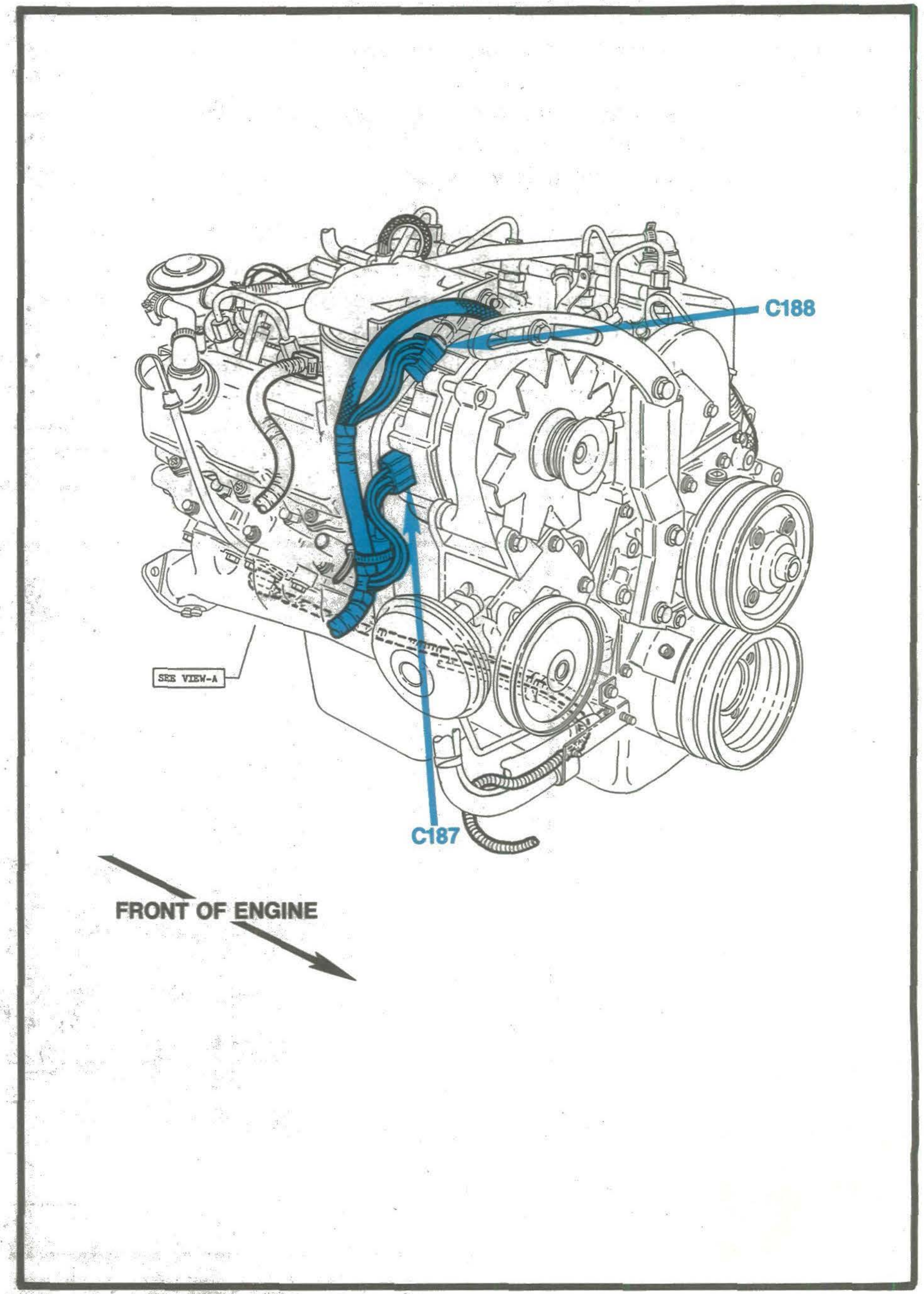
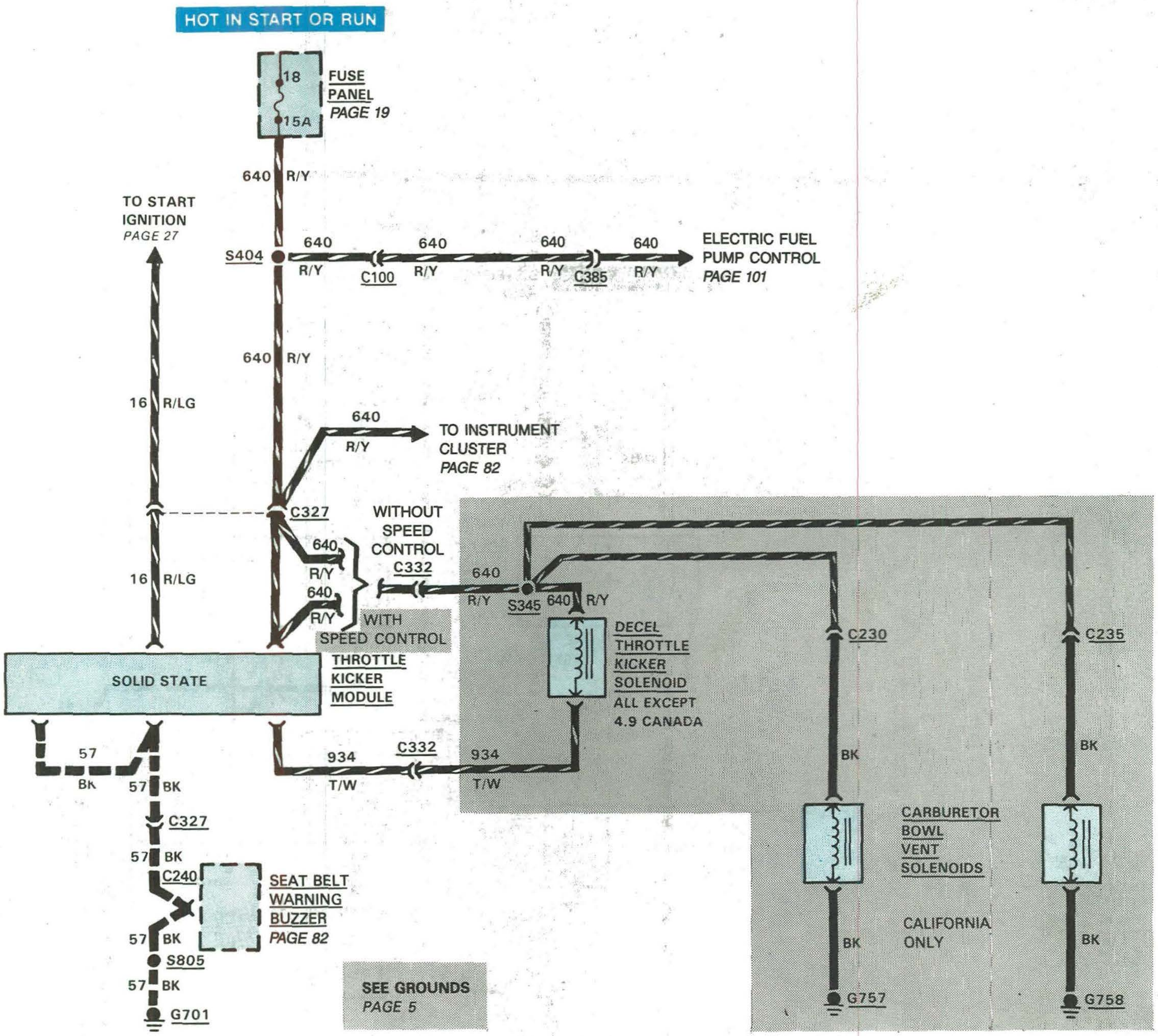
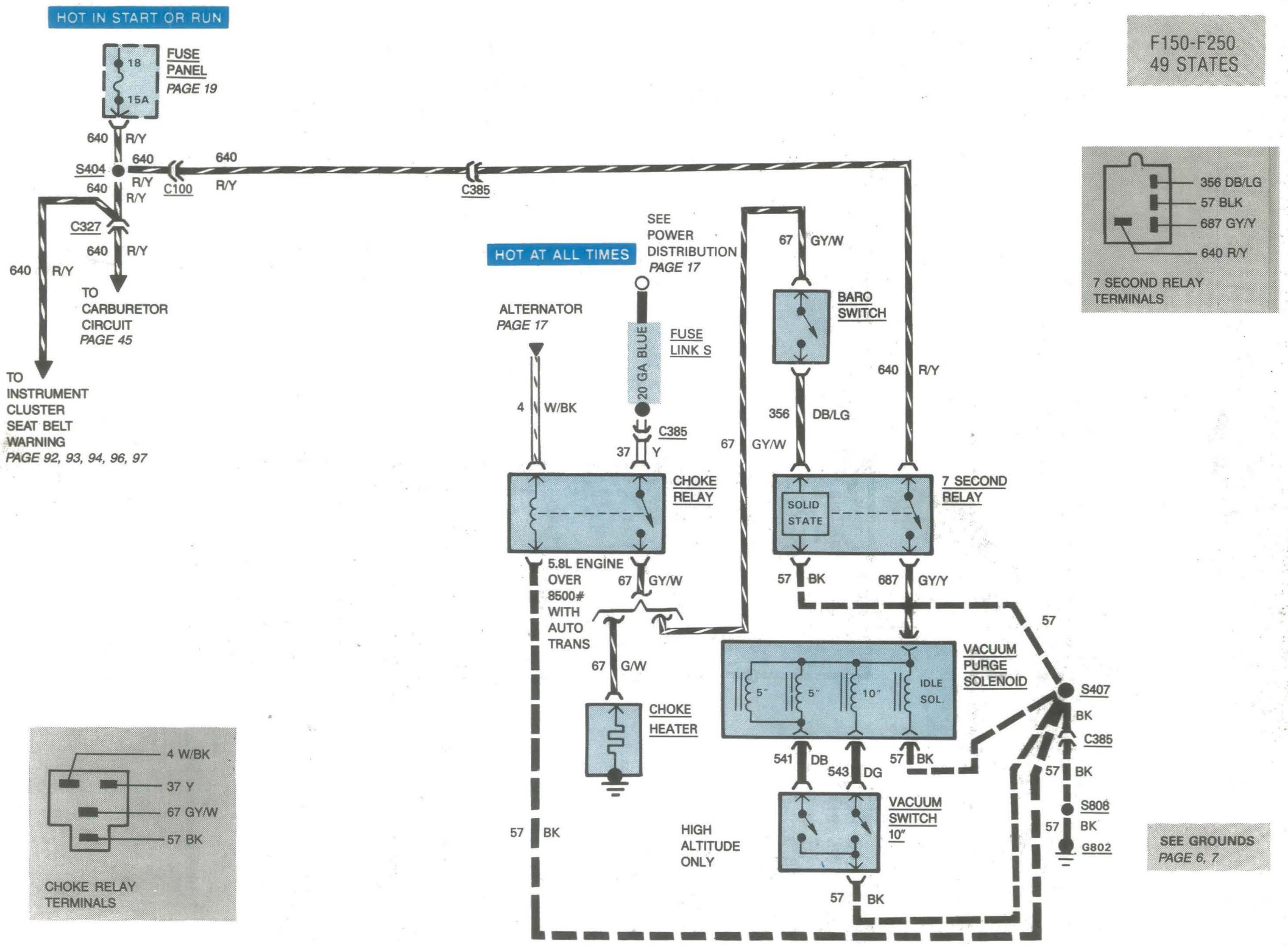


Figure 3 — RH Side of 6.9L Diesel Engine


HOT IN START OR RUN
18
15A
FUSE PANEL
PAGE 19
640 R/Y
TO START IGNITION
PAGE 27
S404
640 R/Y
C100
640 R/Y
640 R/Y
C385
640 R/Y
ELECTRIC FUEL PUMP CONTROL
PAGE 101
640 R/Y
16 R/LG
640 R/Y
TO INSTRUMENT CLUSTER
PAGE 82
C327
WITHOUT SPEED CONTROL
C332
640 R/Y
640 R/Y
WITH SPEED CONTROL
16 R/LG
640 R/Y
S345
640 R/Y
DECEL THROTTLE KICKER SOLENOID
ALL EXCEPT 4.9 CANADA
C230
C235
SOLID STATE
THROTTLE KICKER MODULE
57 BK
57 BK
934 T/W
C332
934 T/W
BK
BK
C327
57 BK
C240
SEAT BELT WARNING BUZZER
PAGE 82
57 BK
S805
57 BK
G701
CARBURETOR BOWL VENT SOLENOIDS
CALIFORNIA ONLY
BK
BK
G757
G758
SEE GROUNDS
PAGE 5

5.8L 4V CARBURETOR CIRCUITS



HOW THE CIRCUIT WORKS

ALTITUDE AIR BLEED SYSTEM — 5.8L V-8 ENGINE

The altitude air bleed system is used on the 5.8L 4V engine. The system operates only when the vehicle is driven in altitudes above 1036-1219 m (3400-4000 ft) above sea level. During operation, the system will lean out the air/fuel mixture by allowing a regulated amount of additional air to enter the intake manifold. The additional air enters the carburetor through a nipple located under the throttle plates. The amount of air entering the carburetor depends on the engine operating mode.

Above the preset altitude, the aneroid-operated **Barometric Pressure Switch** closes to provide a ground path for the **Idle Solenoid** and both **Vacuum Switches**. The **Idle Solenoid**, when opened, provides a restricted air bleed at engine idle. The valve will remain open during all engine operating modes above the preset altitude. Whenever the intake manifold vacuum drops below 10 inches, the **10 Inch Vacuum Switch** closes to complete the **10 Inch Vacuum Solenoid** ground circuit. Whenever the intake manifold vacuum drops below 5 inches, the **5 Inch Vacuum Switch** closes to complete the **5 Inch Vacuum Solenoid** ground circuit. Energizing of the **10 Inch Vacuum Solenoid** is timed to happen during moderately heavy acceleration. When energized, this solenoid allows additional air to enter the air bleed system to lean out the rich air/fuel mixture which is caused by the natural enrichment of the fuel system due to the high altitude. The two **5 Inch Vacuum Solenoids** are energized as a pair to also lean out the rich system caused by the natural enrichment of the fuel system due to the high altitude.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Barometric Pressure Switch	RH fender apron			
Carburetor Bowl Vent Solenoids	Right side of carburetor	37-4		
Choke Heater	Part of carburetor	36-3, 37-5		
Choke Heater Relay	LH fender apron			
Decel Throttle Kicker Solenoid	Right side of engine	36-3, 37-5		
Fuse Link S	Near starter relay			
Seven Second Relay	RH fender apron			
Canister Purge Solenoid	RH fender apron			
Throttle Kicker Module	Behind LH side of I/P	48-1		
Throttle Positioner Solenoid	Left side of carburetor	35-2		
Vacuum Purge Solenoid	RH fender apron			
Connector C100	LH thru dash			53
Connector C230	Right of carburetor	37-4, 37-5, 38-6		1
Connector C233	Near alternator	36-3		1
Connector C233A	Near choke heater			1
Connector C235	Right front or carburetor	37-5, 38-6		2
Connector C248	Near starter relay		GY/BK	4
Connector C325	Near ignition module		BK	4
Connector C327	Behind LH side of I/P	48-1		3
Connector C332	LH rear of engine	36-3	BK	4
Ground G701	Behind I/P near center			
Ground G757	Right rear carburetor stud	37-5, 38-6		
Ground G758	Right front carburetor stud	37-5, 38-6		
Ground G801	LH inner fender behind headlamp			
Ground G802	RH inner fender behind headlamp			
Splice S110	Near fuel pump cutoff relay T/O			
Splice S404	Near clutch switch T/O			
Splice S407	Near vacuum purge solenoid T/O			
Splice S508	Behind I/P near warning buzzer T/O			
Splice S555	Near ignition module T/O			
Splice S556	Near ignition module T/O			
Splice S805	Near cigar lighter T/O			

DURASPARK

With the **Ignition Switch** in START or RUN, the **Throttle Positioner Solenoid** and the **Carburetor Float Bowl Vent Solenoid** are powered through **Fuse 18.**

When powered, the **Throttle Positioner Solenoid** adjusts the engine idle to its normal setting. With the **Ignition Switch** in OFF, the unpowered **Throttle Positioner Solenoid** allows the throttle to close completely. This prevents run-on (dieseling).

The **Carburetor Float Bowl Vent Solenoid** permits fuel bowl vapors to flow off the carbon cannister when the engine is off. With the **Ignition Switch** in START or RUN, the valve closes and the float bowl vents through the internal vent tube to the carburetor air horn and into the engine intake.

With the **Ignition Switch** in START or RUN, the **Throttle Kicker Vacuum Valve Solenoid** or **Carburetor Vacuum Valve Solenoid** is powered through **Fuse 18.** The ground path is supplied by the **Throttle Kicker Module.** This module receives electrical impulses from the **Ignition Coil** primary and grounds the vacuum valve solenoid at speeds above 1850 rpm.

TROUBLESHOOTING HINTS

IF THROTTLE POSITIONER SYSTEM DOESN'T WORK

- Check **Fuse 18** by operating **Seatbelt Warning.**
- Check grounds at **BK** wires.
- Check **Throttle Kicker Vacuum Valve Solenoid** or **Carburetor Vacuum Valve Solenoid.**

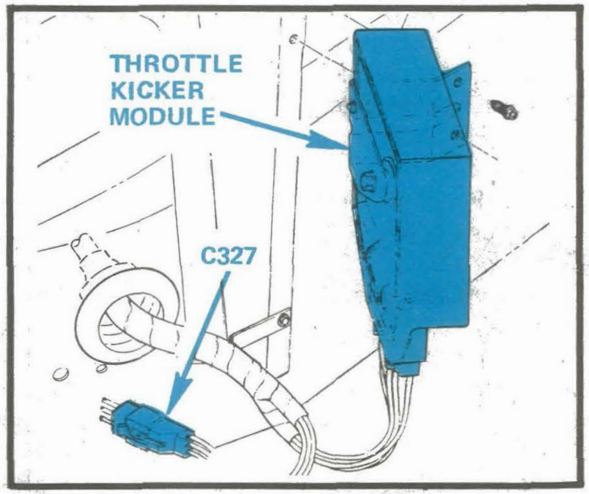
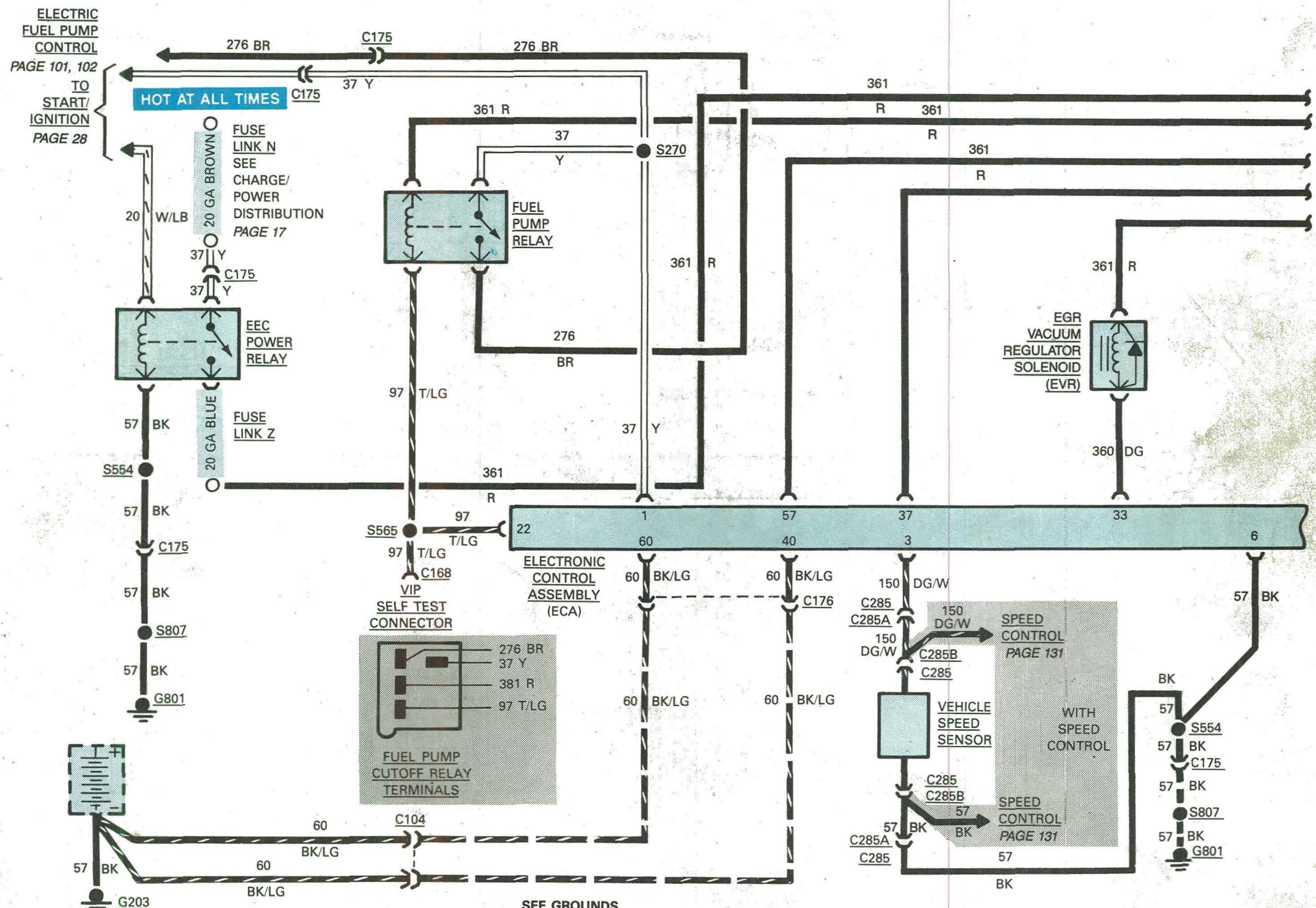
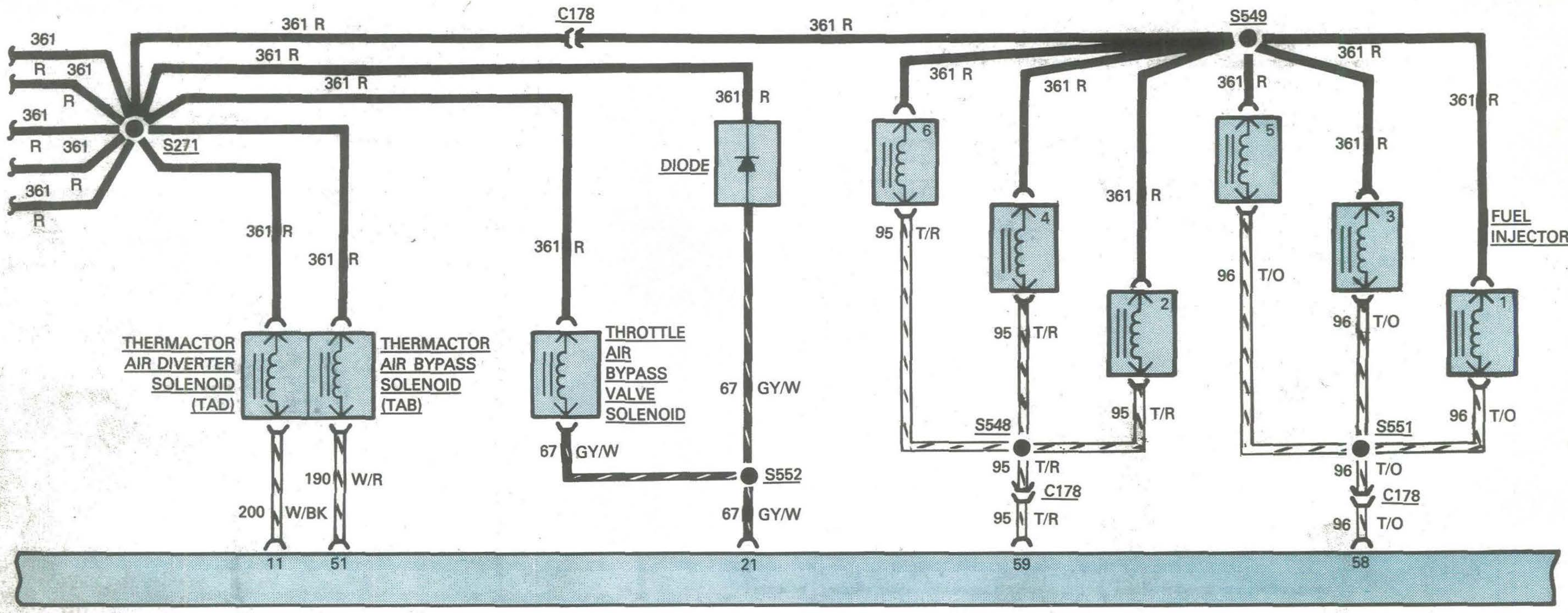


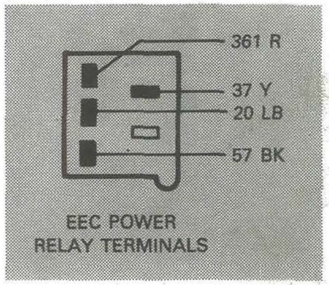
Figure 1 - Under LH Side Of I/P



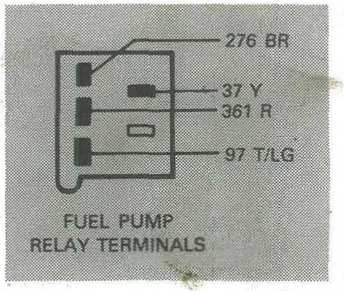
SEE GROUNDS
PAGE 12, 6, 7

ELECTRONIC ENGINE CONTROL (EEC) (4.9L ONLY)

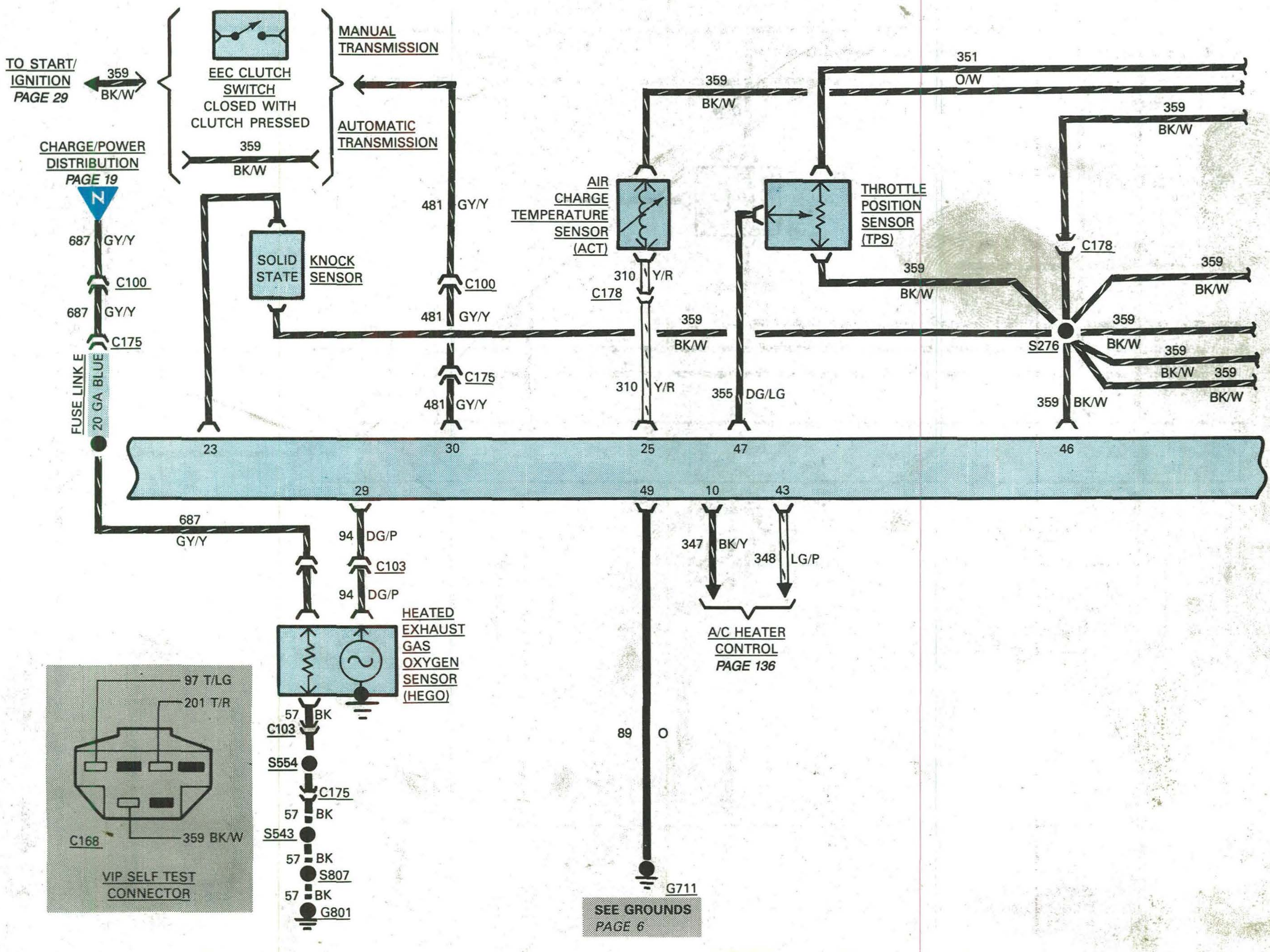




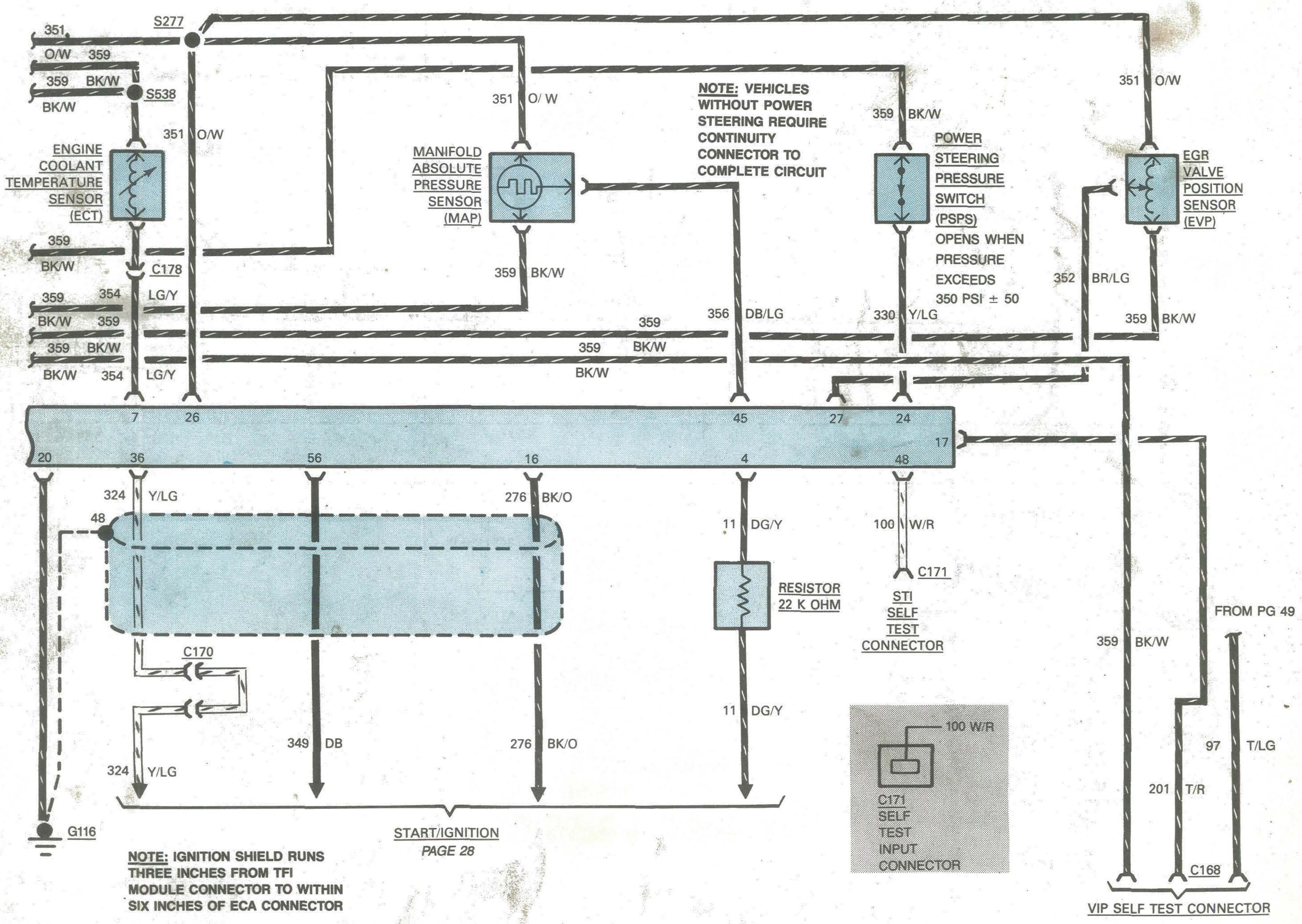
EEC POWER
RELAY TERMINALS



FUEL PUMP
RELAY TERMINALS

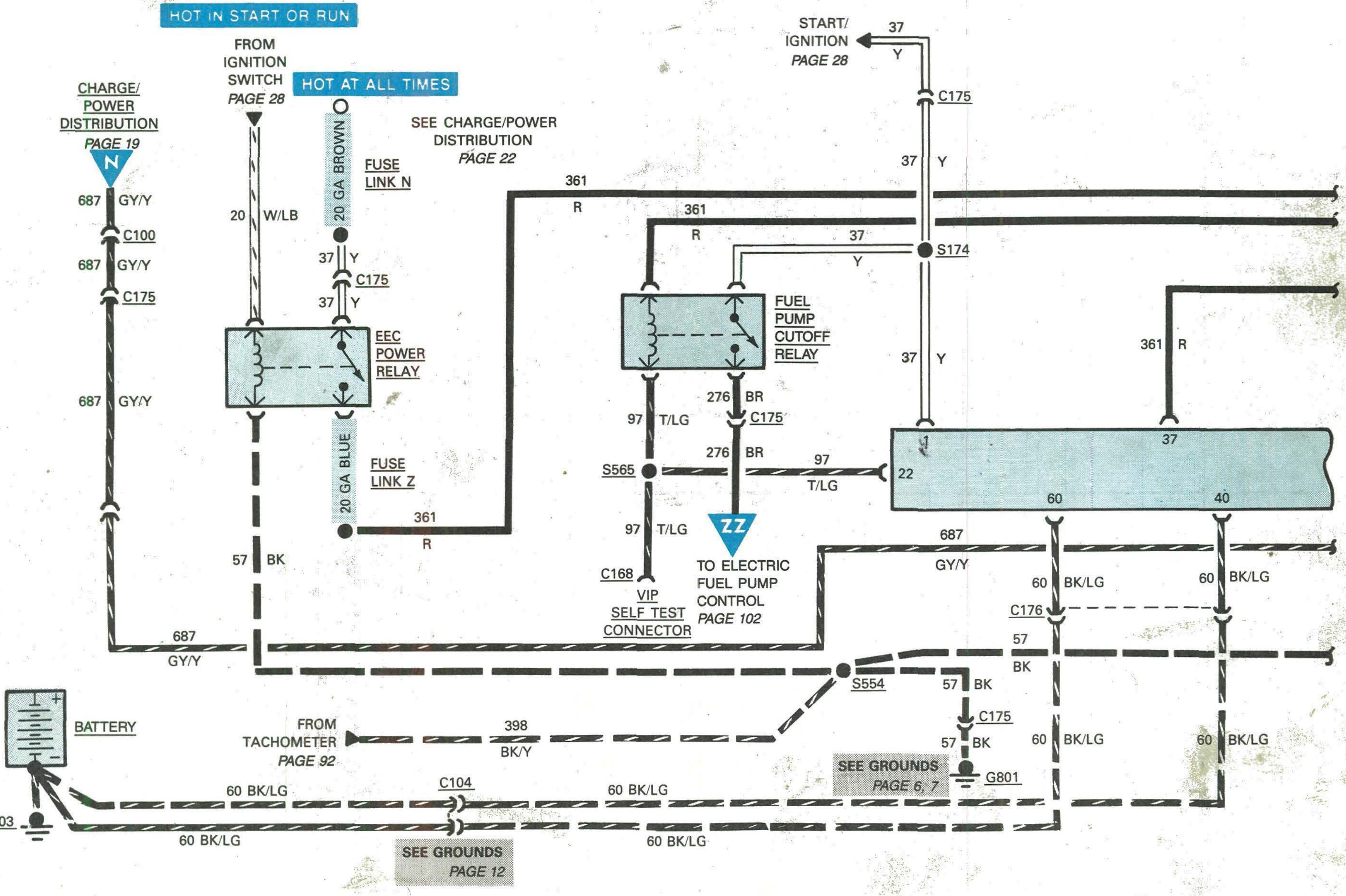

TO START/
IGNITION
PAGE 29
359
BK/W
EEC CLUTCH
SWITCH
CLOSED WITH
CLUTCH PRESSED
MANUAL
TRANSMISSION
AUTOMATIC
TRANSMISSION
359
BK/W
CHARGE/POWER
DISTRIBUTION
PAGE 19
N
687 GY/Y
C100
687 GY/Y
C175
FUSE LINK E
20 GA BLUE
SOLID
STATE
KNOCK
SENSOR
481 GY/Y
C100
481 GY/Y
C175
481 GY/Y
359
BK/W
AIR
CHARGE
TEMPERATURE
SENSOR
(ACT)
310 Y/R
C178
359
BK/W
310 Y/R
355 DG/LG
THROTTLE
POSITION
SENSOR
(TPS)
351
O/W
359
BK/W
C178
359
BK/W
359
BK/W
359
BK/W
S276
359
BK/W
359
BK/W
359
BK/W
359 BK/W
23
30
25
47
46
29
49
10
43
687
GY/Y
94 DG/P
C103
94 DG/P
HEATED
EXHAUST
GAS
OXYGEN
SENSOR
(HEGO)
57 BK
C103
S554
C175
57 BK
S543
57 BK
S807
57 BK
G801
347 BK/Y
348 LG/P
A/C HEATER
CONTROL
PAGE 136
89 O
G711
SEE GROUNDS
PAGE 6
97 T/LG
201 T/R
C168
359 BK/W
VIP SELF TEST
CONNECTOR

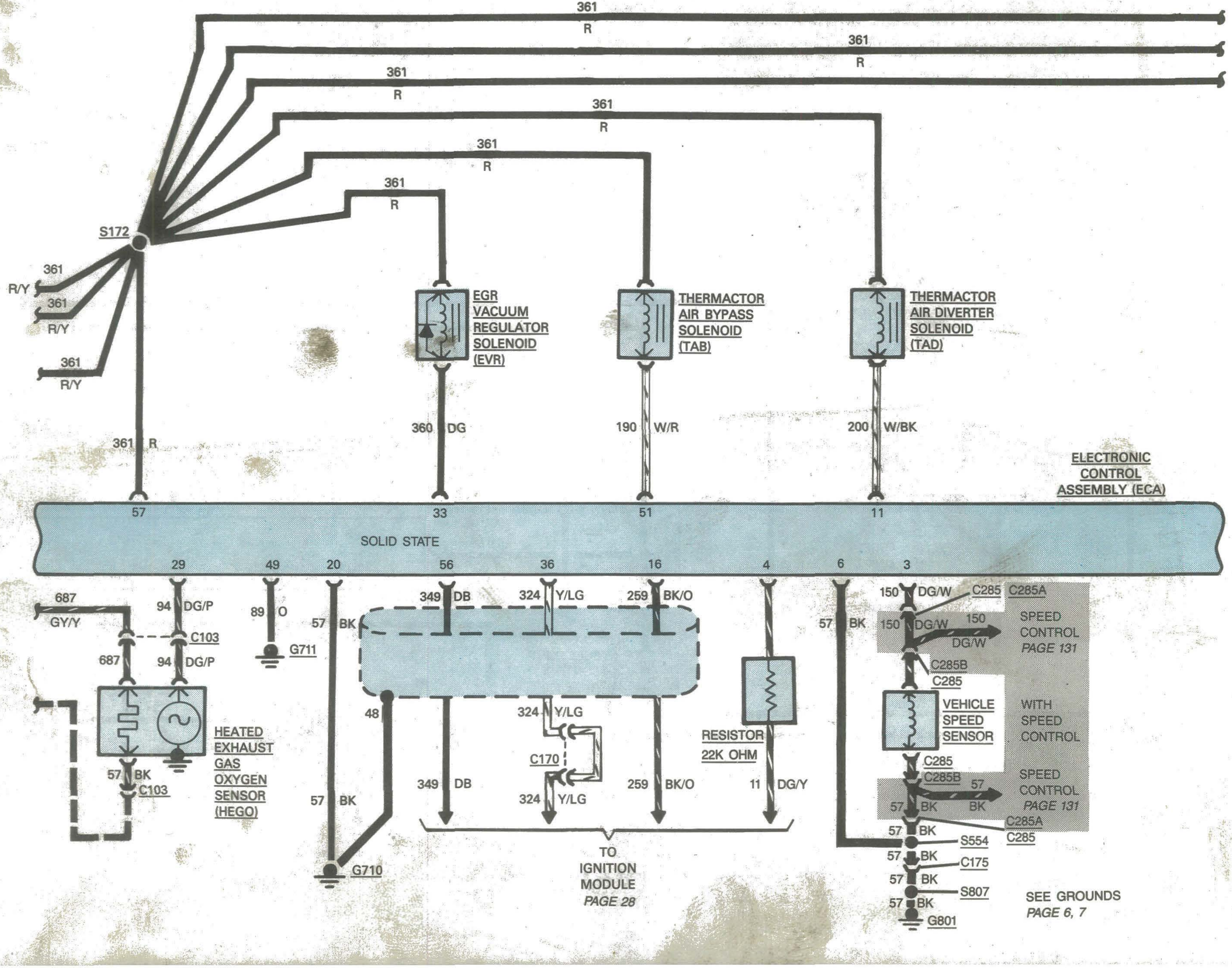
ELECTRONIC ENGINE CONTROL (EEC) (4.9L ONLY)

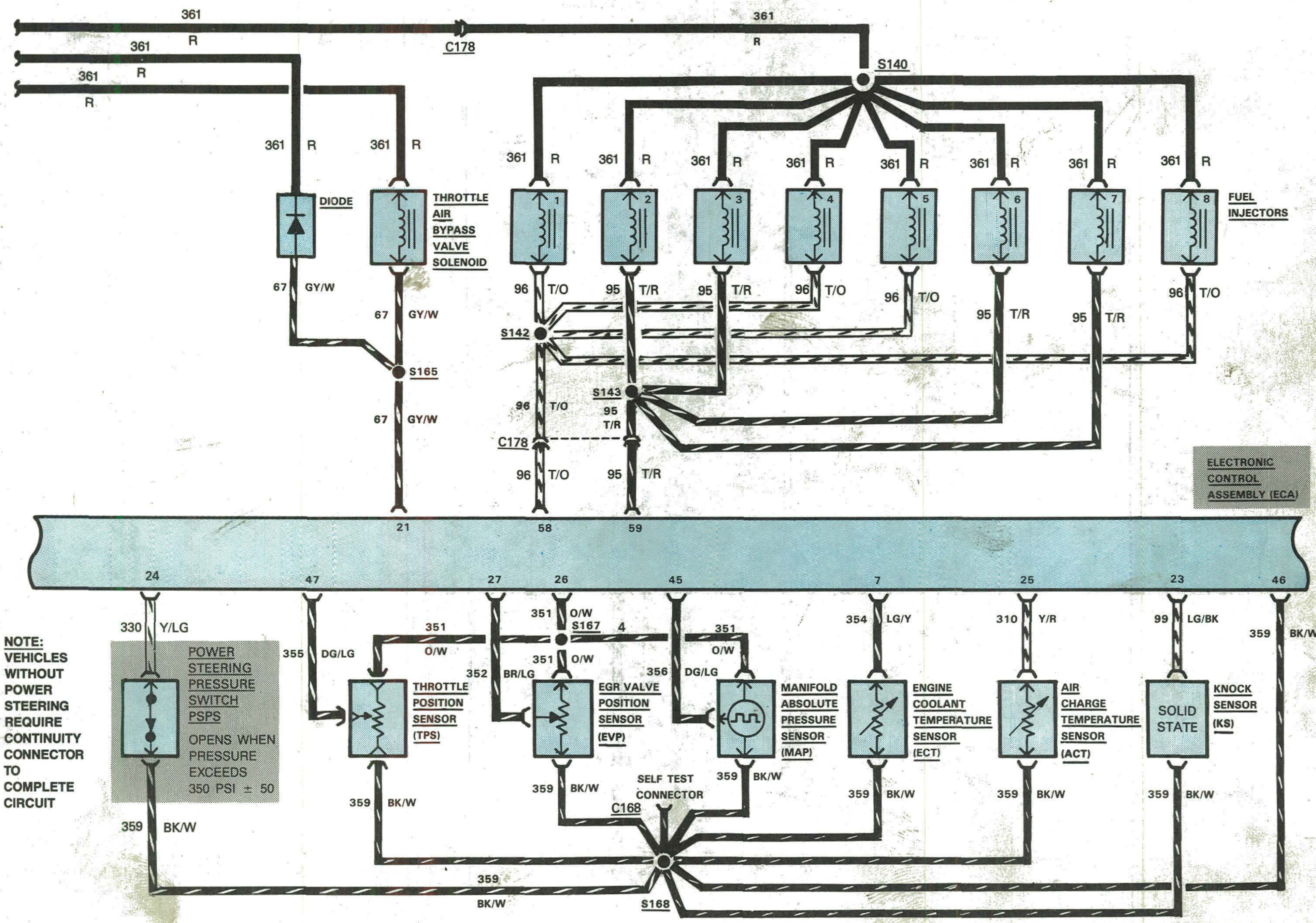


NOTE: VEHICLES WITHOUT POWER STEERING REQUIRE CONTINUITY CONNECTOR TO COMPLETE CIRCUIT

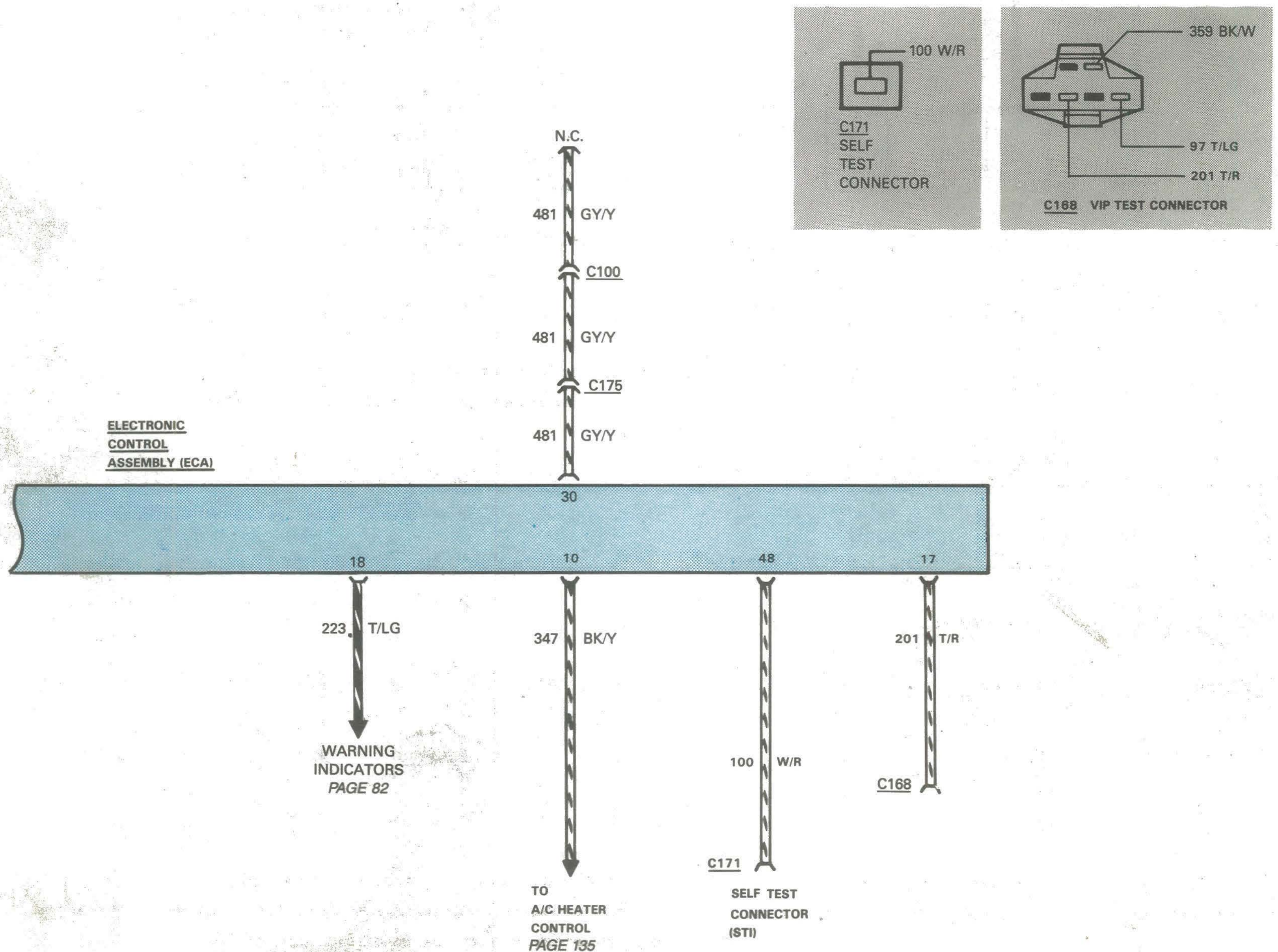
NOTE: IGNITION SHIELD RUNS THREE INCHES FROM TFI MODULE CONNECTOR TO WITHIN SIX INCHES OF ECA CONNECTOR


HOT IN START OR RUN
FROM IGNITION SWITCH PAGE 28
HOT AT ALL TIMES
CHARGE/ POWER DISTRIBUTION PAGE 19
N
687 GY/Y
C100
687 GY/Y
C175
687 GY/Y
20 W/LB
20 GA BROWN
FUSE LINK N
37 Y
C175
37 Y
EEC POWER RELAY
20 GA BLUE
FUSE LINK Z
361 R
57 BK
SEE CHARGE/POWER DISTRIBUTION PAGE 22
361 R
361 R
START/ IGNITION PAGE 28
37 Y
C175
37 Y
37 Y
S174
FUEL PUMP CUTOFF RELAY
97 T/LG
276 BR
C175
276 BR
S565
97 T/LG
97 T/LG
C168
VIP SELF TEST CONNECTOR
ZZ
TO ELECTRIC FUEL PUMP CONTROL PAGE 102
37 Y
361 R
1
37
22
60
40
687 GY/Y
60 BK/LG
60 BK/LG
C176
57 BK
S554
57 BK
C175
57 BK
G801
SEE GROUNDS PAGE 6, 7
60 BK/LG
60 BK/LG
687 GY/Y
BATTERY
FROM TACHOMETER PAGE 92
398 BK/Y
60 BK/LG
C104
60 BK/LG
G203
60 BK/LG
60 BK/LG
SEE GROUNDS PAGE 12


361
R
361
R
361
R
361
R
361
R
361
R
S172
361
R/Y
361
R/Y
361
R/Y
EGR VACUUM REGULATOR SOLENOID (EVR)
THERMACTOR AIR BYPASS SOLENOID (TAB)
THERMACTOR AIR DIVERTER SOLENOID (TAD)
361 R
360 DG
190 W/R
200 W/BK
ELECTRONIC CONTROL ASSEMBLY (ECA)
57
33
51
11
SOLID STATE
29
49
20
56
36
16
4
6
3
687
GY/Y
94 DG/P
C103
687
94 DG/P
89 O
G711
57 BK
349 DB
324 Y/LG
259 BK/O
48
HEATED EXHAUST GAS OXYGEN SENSOR (HEGO)
57 BK
C103
57 BK
G710
324 Y/LG
C170
349 DB
324 Y/LG
259 BK/O
RESISTOR 22K OHM
11 DG/Y
TO IGNITION MODULE PAGE 28
150 DG/W
C285
C285A
57 BK
150 DG/W
150 DG/W
SPEED CONTROL PAGE 131
C285B
C285
VEHICLE SPEED SENSOR
WITH SPEED CONTROL
C285
C285B
57 BK
57 BK
SPEED CONTROL PAGE 131
C285A
C285
57 BK
S554
57 BK
C175
57 BK
S807
57 BK
G801
SEE GROUNDS PAGE 6, 7


361 R
C178
S140
361 R
DIODE
THROTTLE AIR BYPASS VALVE SOLENOID
1
2
3
4
5
6
7
8
FUEL INJECTORS
67 GY/W
96 T/O
95 T/R
S142
S165
S143
C178
ELECTRONIC CONTROL ASSEMBLY (ECA)
21
58
59
24
47
27
26
45
7
25
23
46
330 Y/LG
POWER STEERING PRESSURE SWITCH PSPS
OPENS WHEN PRESSURE EXCEEDS 350 PSI ± 50
355 DG/LG
351 O/W
S167
4
352 BR/LG
356 DG/LG
THROTTLE POSITION SENSOR (TPS)
EGR VALVE POSITION SENSOR (EVP)
MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)
354 LG/Y
ENGINE COOLANT TEMPERATURE SENSOR (ECT)
310 Y/R
AIR CHARGE TEMPERATURE SENSOR (ACT)
99 LG/BK
SOLID STATE
KNOCK SENSOR (KS)
359 BK/W
SELF TEST CONNECTOR
C168
S168

NOTE: VEHICLES WITHOUT POWER STEERING REQUIRE CONTINUITY CONNECTOR TO COMPLETE CIRCUIT


100 W/R
C171
SELF
TEST
CONNECTOR
359 BK/W
97 T/LG
201 T/R
C168 VIP TEST CONNECTOR
N.C.
481 GY/Y
C100
481 GY/Y
C175
481 GY/Y
ELECTRONIC
CONTROL
ASSEMBLY (ECA)
30
18
10
48
17
223 T/LG
347 BK/Y
201 T/R
100 W/R
C168
WARNING
INDICATORS
PAGE 82
C171
TO
A/C HEATER
CONTROL
PAGE 135
SELF TEST
CONNECTOR
(STI)

HOW THE SYSTEM WORKS

The **Electronic Engine Control-IV System (EEC-IV)** is a controlling system designed to optimize tailpipe emissions, fuel economy, driveability, and performance. This is accomplished by means of an on-board **Electronic Control Assembly (ECA)**, which receives input from various sensors. The **ECA** makes computations based on these inputs, then sends controlling signals to various components to achieve desired air/fuel ratio, ignition timing, EGR flow, **Thermactor** air flow and idle speed.

System Inputs

The **Profile Ignition Pick-Up (PIP) Sensor** supplies crankshaft position and frequency information to the **ECA** (from the distributor).

The **Throttle Position Sensor (TPS)** provides the **ECA** with a signal proportional to the opening angle of the throttle plate.

The **Engine Coolant Temperature (ECT) Sensor** monitors the temperature of the engine coolant and provides a corresponding signal to the **ECA**.

The **Heated Exhaust Gas Oxygen (HEGO) Sensor** sends a voltage signal to the **ECA** which indicates the oxygen level in the exhaust gases.

The **Manifold Absolute Pressure (MAP) Sensor** measures the pressure in the intake manifold and provides this information as a variable frequency signal to the **ECA**. With the ignition switch in the Key-On/Engine-Off position, the MAP sensor measures the Barometric Pressure in the intake manifold. With the ignition switch in the Key-On/Engine-Running position, the MAP sensor measures the varying pressure (Vacuum) in the intake manifold.

The **Power Steering** pressure switch signals the **ECA** when the power steering pressure increases the load on the engine, to increase the idle speed.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Air Charge Sensor	4.9L #1 lower intake manifold runner 5.0L #6 lower intake manifold runner	141-2 40-9		
EEC Clutch Switch	Above clutch pedal			
EEC Power Relay	Under plastic shield at the air cleaner support bracket			
EGR Vacuum Regulator Solenoid	4.9L at rear of engine on rocker cover bracket 5.0L on bracket on intake manifold.	140-1 40-9		
EGR Valve Position Sensor	At EGR valve on intake manifold	39-8, 140-1		
Electronic Control ASM	Behind LH kick panel			
Engine Coolant Temperature Sensor	4.9L at *thermostat housing* 5.0L at intake manifold heater hose elbow	141-2 40-9		
Fuel Pump Relay	Under plastic shield at the air cleaner support bracket			
Fuse Link E	At C175 LH engine compartment			
Fuse Link N	Near starter relay			
Fuse Link Z	At EEC power relay			
Heated Exhaust Gas Oxygen Sensor	In communicator tube connecting both exhaust pipes	39-8, 141-2		
Knock Sensor	4.9L in cylinder block forward of the distributor 5.0L in cylinder block behind the intake manifold	140-1		
Manifold Absolute Pressure Sensor	On bracket above heater or A/C evaporator *housing*			
Power Steering Pressure Switch	In power steering pressure hose near the steering gear			
Thermactor Air Bypass Solenoid	4.9L at rear of engine on rocker cover bracket 5.0L on bracket on intake manifold	140-1 40-9		
Thermactor Air Diverter Solenoid	4.9L at rear of engine on rocker cover bracket 5.0L on bracket on intake manifold	140-1 40-9		
Throttle Air Bypass Valve Solenoid	On throttle body	40-9, 140-1		
Throttle Position Sensor	Connected to throttle body shaft	39-8, 140-1		
Vehicle Speed Sensor	At transmission			
Connector C100	LH thru dash			53
Connector C103	Near HEGO sensor			4

(Continued on next page)

The **EGR Valve Position (EVP) Sensor** signals the **ECA** with the position of the **EGR valve pintle** position.

The **Air Charge Temperature (ACT) Sensor** signals the **ECA** with the temperature of the air in the intake manifold.

The **Knock Sensor** signals the **ECA** to retard timing if the engine starts to detonate.

An **A/C Clutch Compressor (ACC) Signal** is used to indicate to the **ECA** when the A/C compressor is turned On. This will allow the **ECA** to increase the engine idle speed and/or compensate for the increased load.

The **Vehicle Speed Sensor** provides a frequency to the **ECA** to indicate vehicle speed. The **ECA** uses this input for idle speed control and decel fuel shutoff.

The A/C demand **(ACD)** signal is used to indicate to the **ECA** when the climate control switch is in any mode requesting A/C. This will allow the **ECA** to increase the engine idle speed (4.9L only).

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Connector C104	At battery ground pigtail			4
Connector C168	Engine compartment test		GY	6
Connector C170	Near ignition module	40-9, 140-1	BK	2
Connector C171	Engine compartment test			1
Connector C175	Engine compartment LH			10
Connector C176	Engine compartment LH			8
Connector C178	Engine compartment			8
Connector C285	Near vehicle speed sensor		BK	4
Connector C285A	Near vehicle speed sensor		BR	2
Connector C285B	Near vehicle speed sensor		BR	2
Ground G117	Near ignition coil			
Ground G203	RH side of engine			
Ground G710	LH side of dash panel			
Ground G711	LH rear of engine			
Ground G801	LH inner fender behind headlamp			
Splice S140	Between S142 and S143			
Splice S142	Near T/O to No. 4 fuel injector			
Splice S143	Near T/O to No. 8 fuel injector			
Splice S165	In T/O to throttle air by-pass solenoid			
Splice S167	In T/O to MAP sensor			
Splice S168	Near T/O to EEC diode			
Splice S172	Near T/O to EEC diode			
Splice S174	Near T/O to EEC power relay			
Splice S270	Between T/O's to EEC power relay			
Splice S271	Near T/O to C178 (LH side)			
Splice S276	Near T/O to C178 (LH side)			
Splice S277	Near T/O to C178 (RH side)			
Splice S538	Engine compartment near air charge sensor T/O			
Splice S543	Engine compartment near brake sensor T/O			
Splice S547	Engine compartment near HEGO ground T/O			
Splice S548	Engine compartment near #5 fuel injector T/O			
Splice S549	Engine compartment near #3 fuel injector T/O			
Splice S551	Engine compartment near #3 fuel injector T/O			
Splice S552	Engine compartment near throttle air bypass solenoid T/O			
Splice S554	Engine compartment near vehicle speed sensor			
Splice S565	Engine compartment near clutch interlock switch T/O			
Splice S807	Near LH headlamp T/O			

Fuel flow is controlled by **fuel injector solenoids** (six in 6 Cyl. engine, eight in 8 Cyl. engine). The **ECA** regulates the amount of fuel injected into each cylinder by the on/off time of the injectors. The longer the on-time, the greater the fuel flow through the injectors. The **ECA** uses information received from the system input sensors to determine injector on/off-time.

Fuel pressure is built up by the Electric Fuel Pumps when the **ECA** supplies a ground through circuit 97 to the **Fuel Pump Relay.** With the **Ignition Switch** in START or RUN, the **EEC Power Relay** supplies voltage through circuit 361 R, to the **Fuel Pump Relay.** This voltage energizes the **Fuel Pump Relay.**

With power applied through the **EEC Power Relay** to the **Fuel Pump Relay,** and with the **Inertia Switch** closed, power is applied to the **Fuel Pumps.**

Current to the **In-Tank Fuel Pump** passes through a resistance wire and this pump, mounted in the fuel tank, pumps fuel at low (5 psi) pressure. Pressure is boosted by the **In-Line Fuel Pump** to approximately 39 psi (5.0L), 55 psi (4.9L).

The efficiency of the catalytic converter is dependent upon the temperature and chemical make-up of exhaust gases. A **Thermactor** air system is used to supply secondary air to the exhaust manifold(s), to the catalyst or to the atmosphere, depending on engine conditions sensed by the **ECA** through the system inputs.

When the **Thermactor Air Bypass Solenoid** is OFF (de-energized), Thermactor air is dumped to the atmosphere rather than routed to the catalytic converter or exhaust manifold.

When the **Thermactor Air Bypass Solenoid** is OFF (de-energized), Thermactor air is dumped to the atmosphere rather than routed to the catalytic converter or exhaust manifold.

With the **Thermactor Air Bypass Solenoid** ON (energized) and the **Thermactor Air Diverter Solenoid** OFF (de-energized) Thermactor air is downstream (to the catalytic converter).

When the **Thermactor Air Bypass Solenoid** and the **Thermactor Air Diverter Solenoid** are ON (energized), Thermactor air is diverted to the exhaust manifold (upstream).

The **Throttle Air Bypass Valve Solenoid** is an electro-mechanical device controlled by the **ECA.** It incorporates a solenoid which positions a variable-area metering valve. This valve is used to control both warm and cold engine airflow into the intake manifold. This allows the **ECA** to control the engine warm and cold speed, and allow for "no-touch" starting.

The **EGR Vacuum Regulator Solenoid** controls EGR valve movement. The **ECA** receives data from various sensors. It also checks existing valve position through the **EGR Valve Position Sensor** and calculates if the present EGR flow should be increased, maintained or decreased. The **ECA** then determines a proper duty cycle for the **EGR Vacuum Regulator Solenoid** on time to control the EGR valve position.

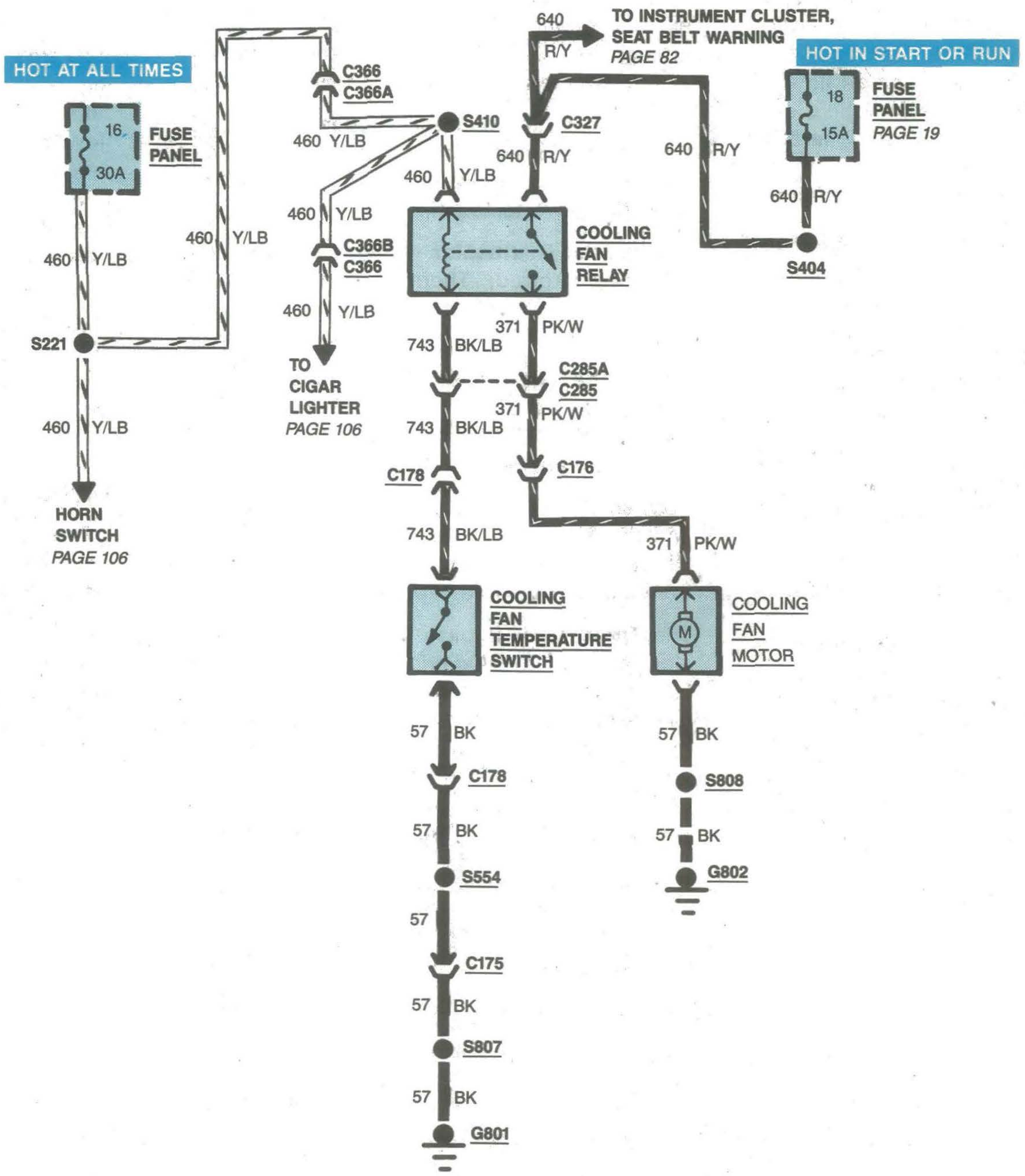
The **Thick Film Integrated IV (TFI-IV) Ignition Module** supplies the spark signal to the distributor through the ignition coil, and calculates the duration. It receives its control signal from the **ECA** through the spark output circuit (324 Y/LG).

TROUBLESHOOTING HINTS

The **EEC-IV** system retains any intermittent trouble codes stored within the last 40 engine starts. With this system, the memory is not erased when the key is turned Off.

Refer to the **Engine/Emissions Diagnosis Manual** and **Technical Service Bulletins** for complete **EEC-IV** test procedures using special Rotunda test equipment.

FUEL INJECTOR COOLING FAN (4.9L ENGINE)



HOW THE CIRCUIT WORKS

With the ignition switch in **START** or **RUN** current will flow from **Fuse** 18. The **Cooling Fan Relay's** coil is energized through **Fuse 16** and is grounded through the **Cooling Fan Temperature** switch. The switch closes when coolant temperature reaches 170°F.

With the **Cooling Fan Temperature Switch** closed, current will flow through the **Cooling Fan Relay** to the **Cooling Fan Motor**.

TROUBLESHOOTING HINTS

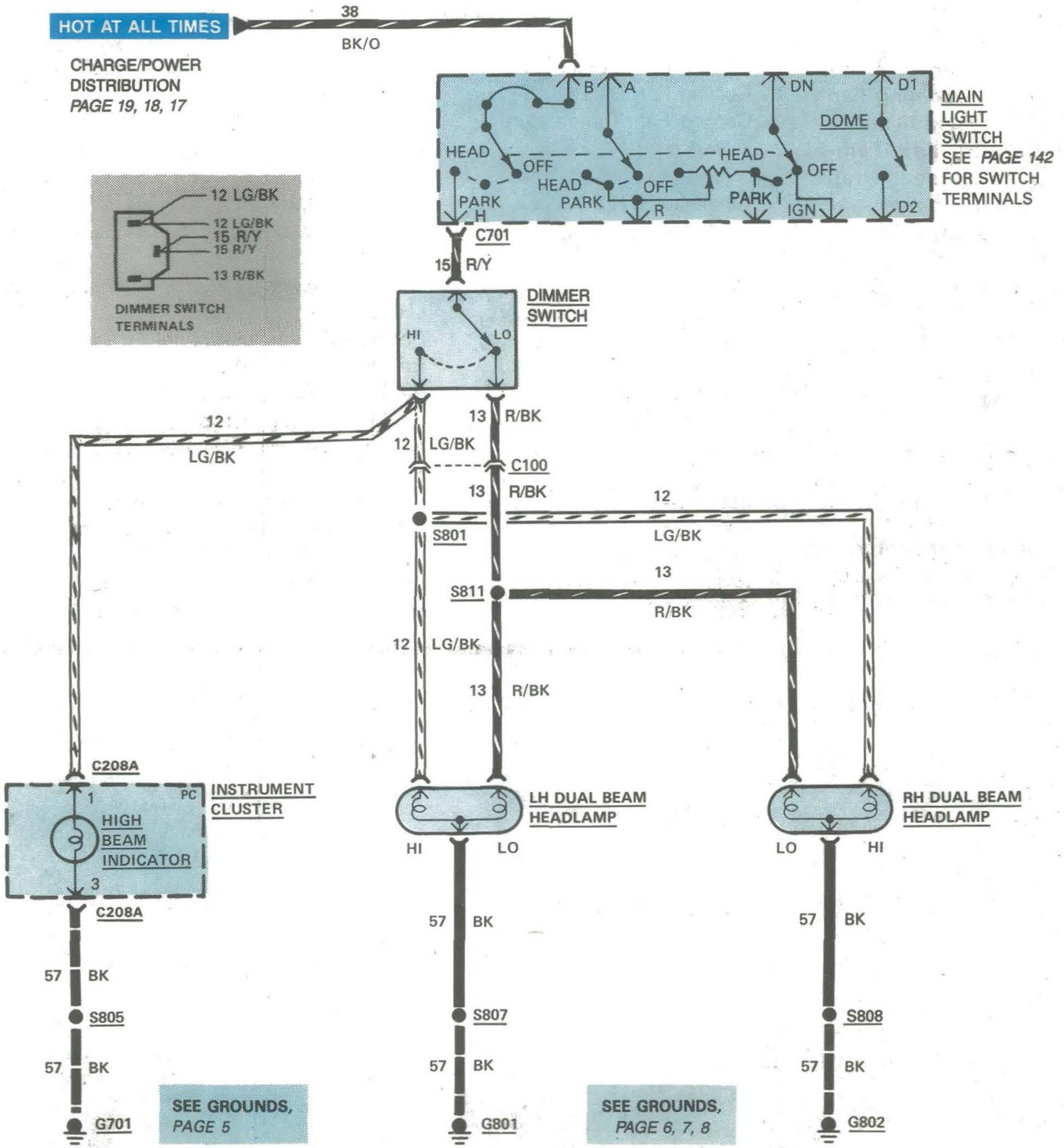
COOLING FAN DOESN'T OPERATE

- Check **Fuse 16** and **Fuse 18**
- Check that G802 is clean and tight.
- Check for voltage at **Cooling Fan Motor**.
- Bypass Cooling Fan Temperature Switch by shorting across connector terminals.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Cooling Fan Motor	RH inner fender			
Cooling Fan Relay	Behind I/P near fuse panel			
Cooling Fan Temperature Switch	Clipped to fuel rail near number one fuel injector	141-2		
Connector C175	LH fender apron		BK	10
Connector C176	LH fender apron		BK	8
Connector C178	LH fender apron		BK	8
Connector C285	LH fender apron		BR	4
Connector C285A	LH fender apron		BR	4
Connector C327	Behind I/P near fuse panel	48-1	GY	3
Connector C366	Behind I/P near fuse panel		GY	3
Connector C366A	Behind I/P near fuse panel		GY	3
Connector C366B	Behind I/P near fuse panel		GY	3
Splice S221	Near ignition switch T/O			
Splice S404	Near clutch switch T/O			
Splice S410	Behind I/P in cooling fan harness			
Splice S554	Engine compartment near speed sensor T/O			
Splice S807	Near LH headlamp T/O			
Ground G801	LH inner fender behind headlamp			
Ground G802	RH inner fender behind headlamp			

HEADLAMPS


HOT AT ALL TIMES
38
BK/O
CHARGE/POWER DISTRIBUTION
PAGE 19, 18, 17
B
A
DN
D1
DOME
HEAD
OFF
HEAD
OFF
HEAD
PARK
OFF
PARK
PARK
H
R
IGN
D2
MAIN LIGHT SWITCH
SEE PAGE 142 FOR SWITCH TERMINALS
C701
15 R/Y
12 LG/BK
12 LG/BK
15 R/Y
15 R/Y
13 R/BK
DIMMER SWITCH TERMINALS
DIMMER SWITCH
HI
LO
12
LG/BK
13 R/BK
12 LG/BK
C100
13 R/BK
12
LG/BK
S801
13
R/BK
S811
12 LG/BK
13 R/BK
C208A
1
PC
INSTRUMENT CLUSTER
HIGH BEAM INDICATOR
3
C208A
LH DUAL BEAM HEADLAMP
HI
LO
RH DUAL BEAM HEADLAMP
LO
HI
57 BK
S805
57 BK
G701
57 BK
S807
57 BK
G801
57 BK
S808
57 BK
G802
SEE GROUNDS, PAGE 5
SEE GROUNDS, PAGE 6, 7, 8

TROUBLESHOOTING HINTS

NO HEADLAMPS, PARK LAMPS OK

- Check for voltage at R/Y wire of **Dimmer Switch.** If bad, check continuity of wire and **Light Switch.**
- Check continuity of **Dimmer Switch.** Repair or replace if bad.

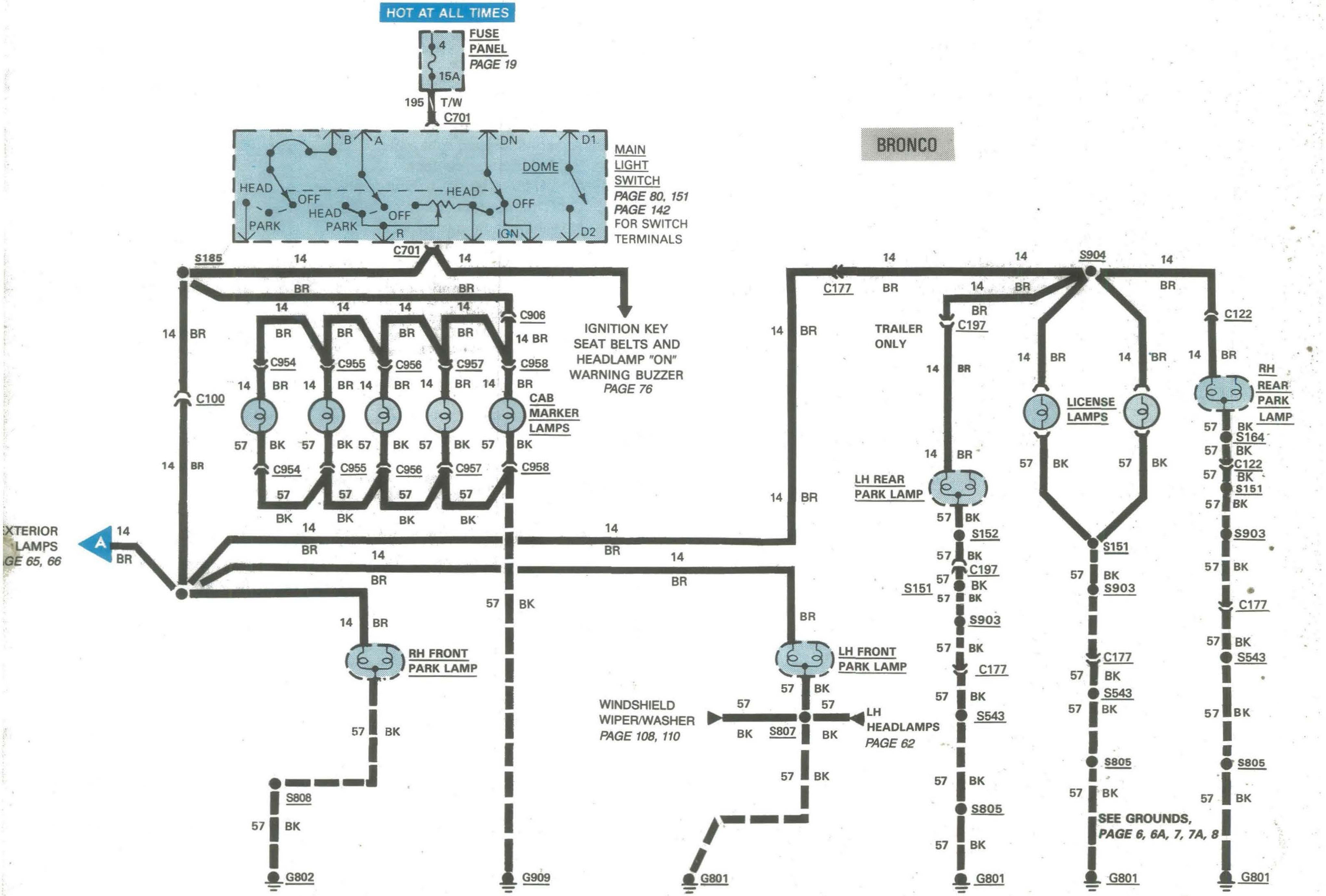
NO HI AND LO BEAM ON ONE SIDE

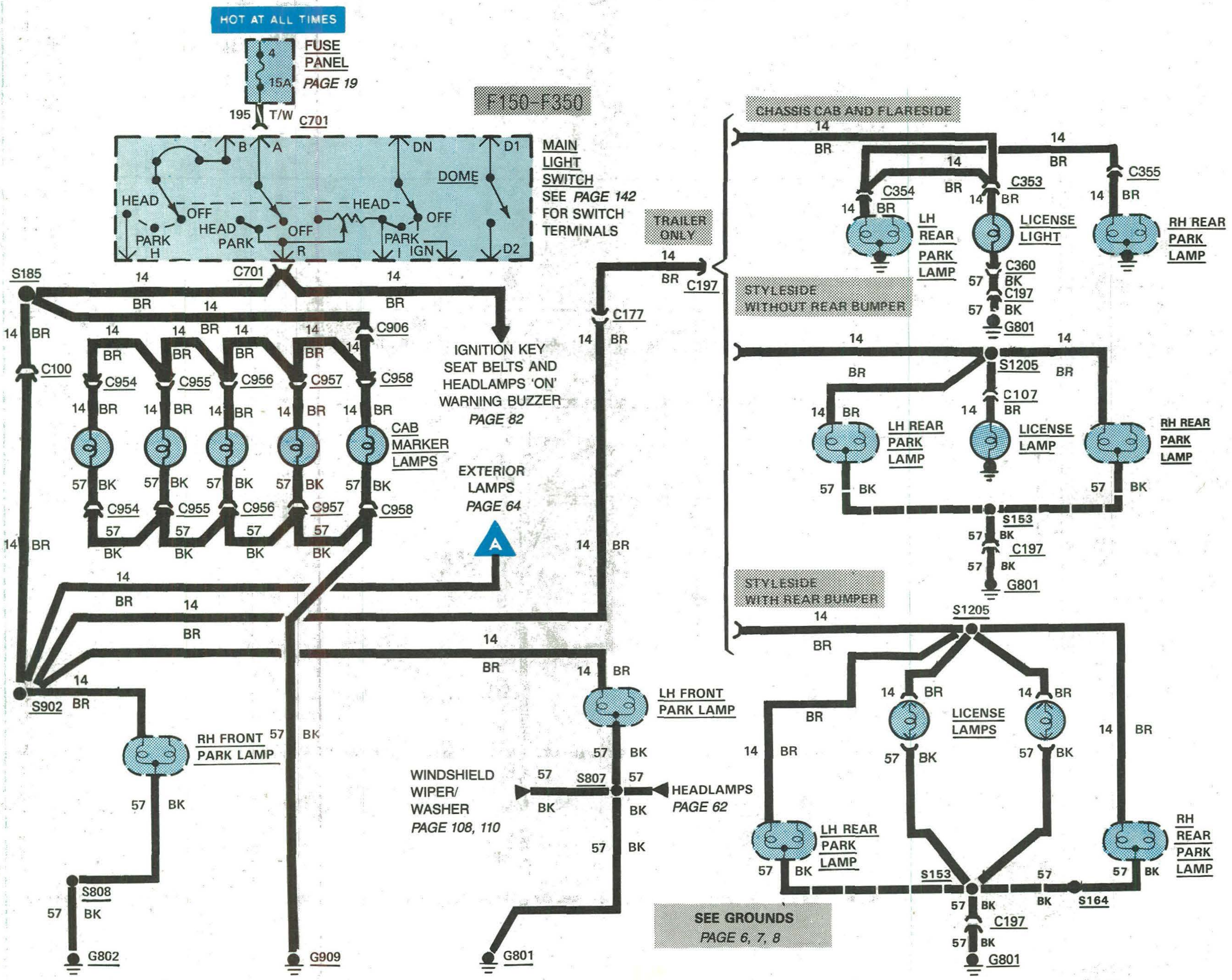
- Make sure ground connection on that side is clean and tight.

COMPONENT LOCATION

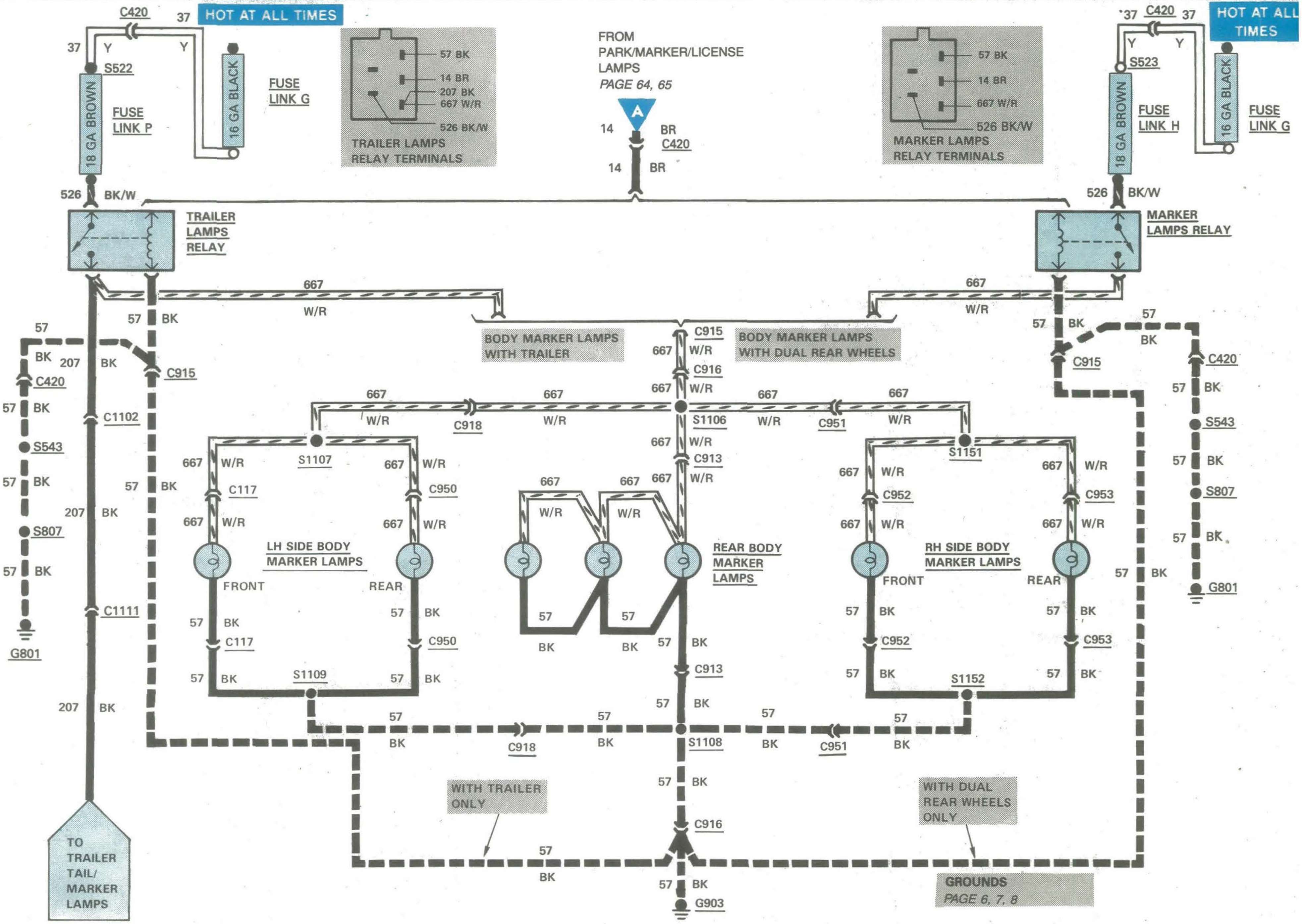
		Page-Figure	Color	Terminals
Main Light Switch	LH side of I/P	112-2		
Dimmer Switch	On floor pan LH side of cab			
Connector C100	LH thru dash			53
Connector C208A	Attached to instrument cluster			14
Connector C701	Attached to main light switch		BK	8
Ground G701	Behind I/P near center			
Ground G801	On LH inner fender behind headlamp			
Ground G802	On RH inner fender behind headlamp			
Splice S801	Near headlamp switch T/O			
Splice S805	Near cigar lighter T/O			
Splice S807	Near LH headlamp T/O			
Splice S808	Near R.F. park lamp T/O			
Splice S811	Near ignition switch T/O			

EXTERIOR LAMPS (PARK, MARKER)




HOT AT ALL TIMES
4
15A
FUSE PANEL
PAGE 19
F150-F350
195
T/W
C701
B
A
DN
D1
DOME
HEAD
OFF
HEAD
PARK
H
HEAD
PARK
OFF
R
PARK
OFF
I
IGN
D2
MAIN LIGHT SWITCH
SEE PAGE 142 FOR SWITCH TERMINALS
TRAILER ONLY
S185
C701
14
BR
C906
C100
C954
C955
C956
C957
C958
57
BK
CAB MARKER LAMPS
IGNITION KEY SEAT BELTS AND HEADLAMPS 'ON' WARNING BUZZER
PAGE 82
EXTERIOR LAMPS
PAGE 64
A
C177
C197
S902
RH FRONT PARK LAMP
S808
G802
G909
LH FRONT PARK LAMP
WINDSHIELD WIPER/ WASHER
PAGE 108, 110
S807
HEADLAMPS
PAGE 62
G801
CHASSIS CAB AND FLARESIDE
C354
C353
C355
LH REAR PARK LAMP
LICENSE LIGHT
RH REAR PARK LAMP
C360
G801
STYLESIDE WITHOUT REAR BUMPER
S1205
C107
LH REAR PARK LAMP
LICENSE LAMP
RH REAR PARK LAMP
S153
STYLESIDE WITH REAR BUMPER
LICENSE LAMPS
LH REAR PARK LAMP
RH REAR PARK LAMP
S164
SEE GROUNDS
PAGE 6, 7, 8

EXTERIOR LAMPS (BODY MARKER, TRAILER)



TROUBLESHOOTING HINTS

PARK/MARKER/LICENSE

- Look for frayed or damaged wires, or loose connections.
- Make sure **C701** is tight.
- Check for voltage at **T/W** wire of **Main Light Switch**. If bad, check harness back to **Battery**.
- If **Instrument Illumination** lamps work, check continuity of **BR** wire in harness.
- If no instrument lamps work, check **Main Light Switch**.

ONE LAMP DOES NOT WORK

- Check bulb.
- Check for frayed or damaged wires, or loose connections.

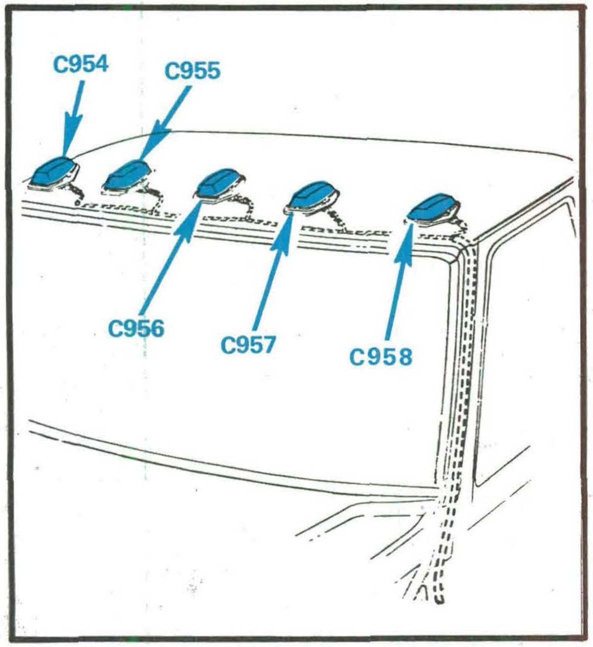


Figure 1 - Top Of Cab

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Fuse Link G	Near starter relay			
Fuse Link H	Near marker lamps relay			
Fuse Link P	Near trailer lamps relay			
Marker Lamp Relay	Attached to dash panel			
Trailer Lamp Relay	Attached to dash panel			
Connector C100	LH thru dash			53
Connector C107	At license lamps	68-1	BR	1
Connector C117	At LH front side body marker lamp	69-8	BR	2
Connector C122	RH side of rear cross support	68-3	BK	4
Connector C177	Engine compartment LH		GY	12
Connector C197	LH side of rear cross support			8
Connector C353	Rear LH side of frame at rear crossmember	68-4	Y	1
Connector C420	Engine compartment LH side		BK	4
Connector C701	At main light switch		BK	8
Connector C906	At LH cowl access hole	75-7	BR	1
Connector C915	Engine compartment LH side		BK	2
Connector C916	At LH side of rear crossmember	68-1	BK	2
Connector C918	Near LH side of rear crossmember	68-1	GY	2
Connector C950	At rear of LH rear fender	69-8	BR	2
Connector C951	Near RH side of rear crossmember	69-6	BR	2
Connector C952	At front of RH rear fender	69-8	BR	2
Connector C953	At rear of RH rear fender		BR	2
Connector C954	In forward part of cab roof	67-1	BK	2
Connector C955	In forward part of cab roof	67-1	BK	2
Connector C956	In forward part of cab roof	67-1	BK	2
Connector C957	In forward part of cab roof	67-1	BK	2
Connector C958	In forward part of cab roof	67-1	BK	2
Connector C1102	Behind LH end of I/P		BR	6
Connector C1111	LH rear of frame		BR	3
Ground G801	On LH inner fender behind headlights			
Ground G802	On RH inner fender behind headlights			
Ground G903	At LH side of rear crossmember	68-1		
Ground G909	At lower LH cowl access hole	69-7		
Splice S151	Near license plate T/O			
Splice S152	Near LH backup lamp T/O			
Splice S153	Near license plate clamp T/O			
Splice S185	Near radio T/O			

(Continued on next page)

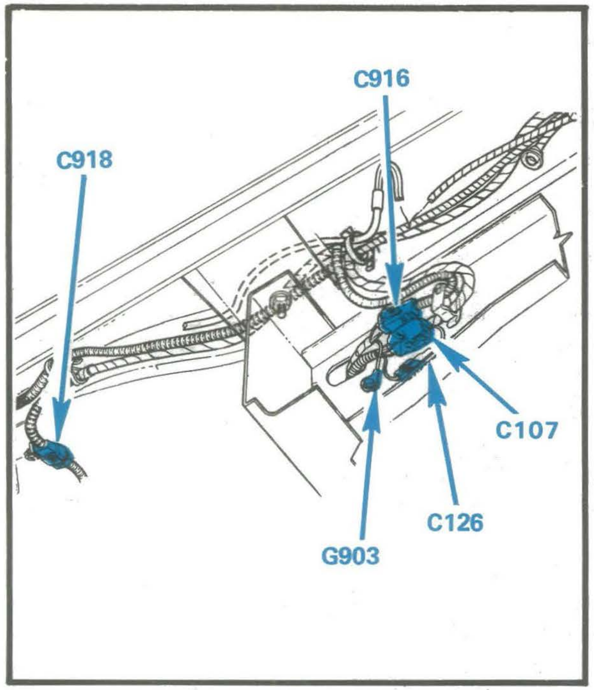


Figure 2 LH Side Of Rear Crossmember

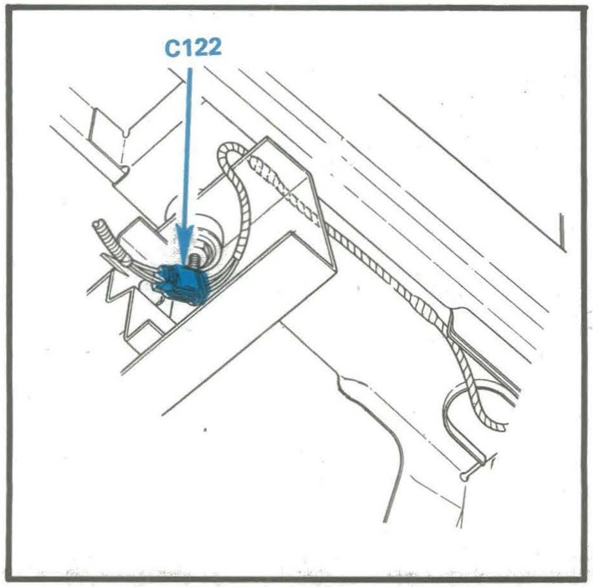


Figure 3 - RH Side Of Rear Crossmember

COMPONENT LOCATION

(Continued from previous page)

		Page-Figure	Color	Terminals
Splice S522	Behind I/P near trailer lamp relay T/O			
Splice S523	Behind I/P near marker lamp relay T/O			
Splice S543	Engine compartment near brake sensor T/O			
Splice S805	Near cigar lighter T/O			
Splice S807	Near LH headlamp T/O			
Splice S808	Near RH park lamp T/O			
Splice S902	Near RH side marker lamp T/O			
Splice S903	Near fuel gage sender & pump T/O			
Splice S904	Near license lamp T/O			
Splice S1205	Near rear license lamp T/O			

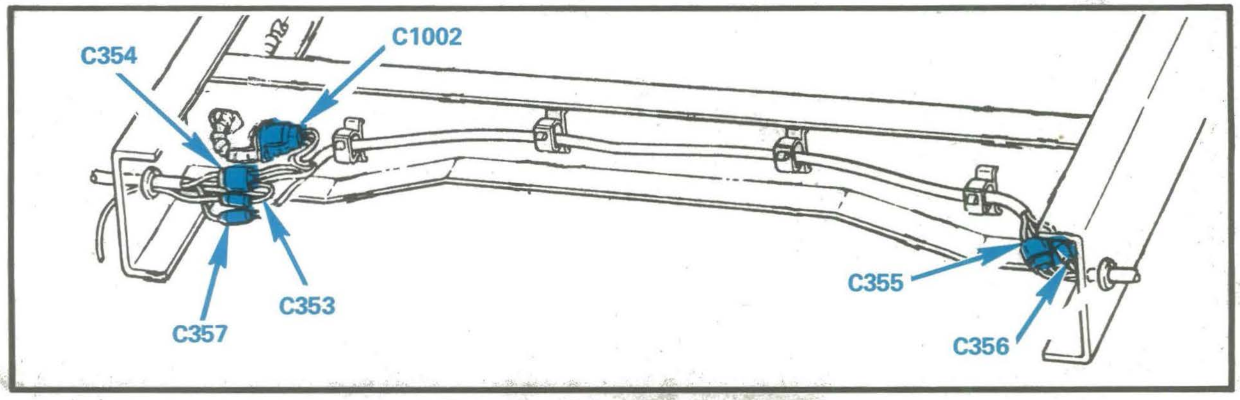


Figure 4 - Rear Frame Crossmember

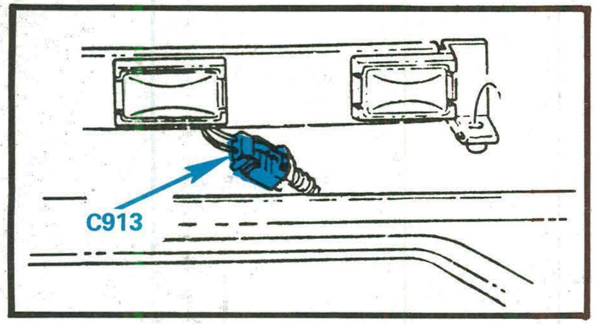


Figure 5— Center Of Rear Bumper

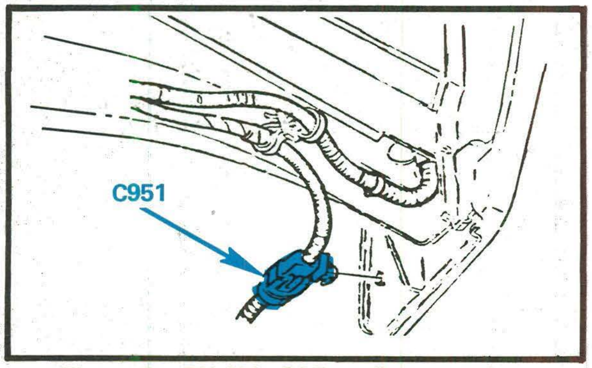


Figure 6— RH Side Of Rear Crossmember

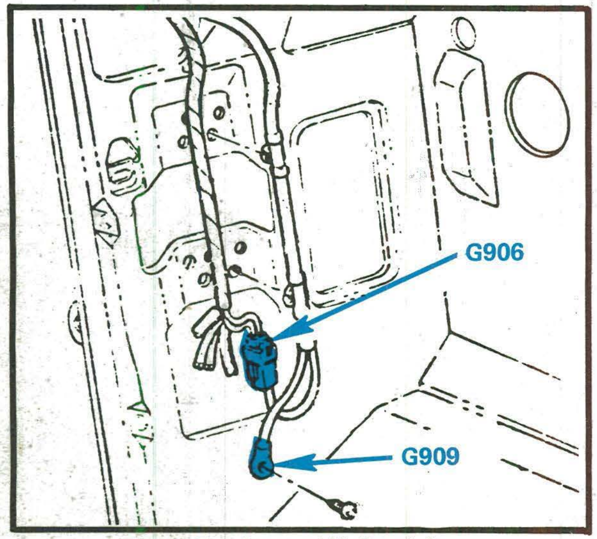


Figure 7— Lower LH Cowl Area

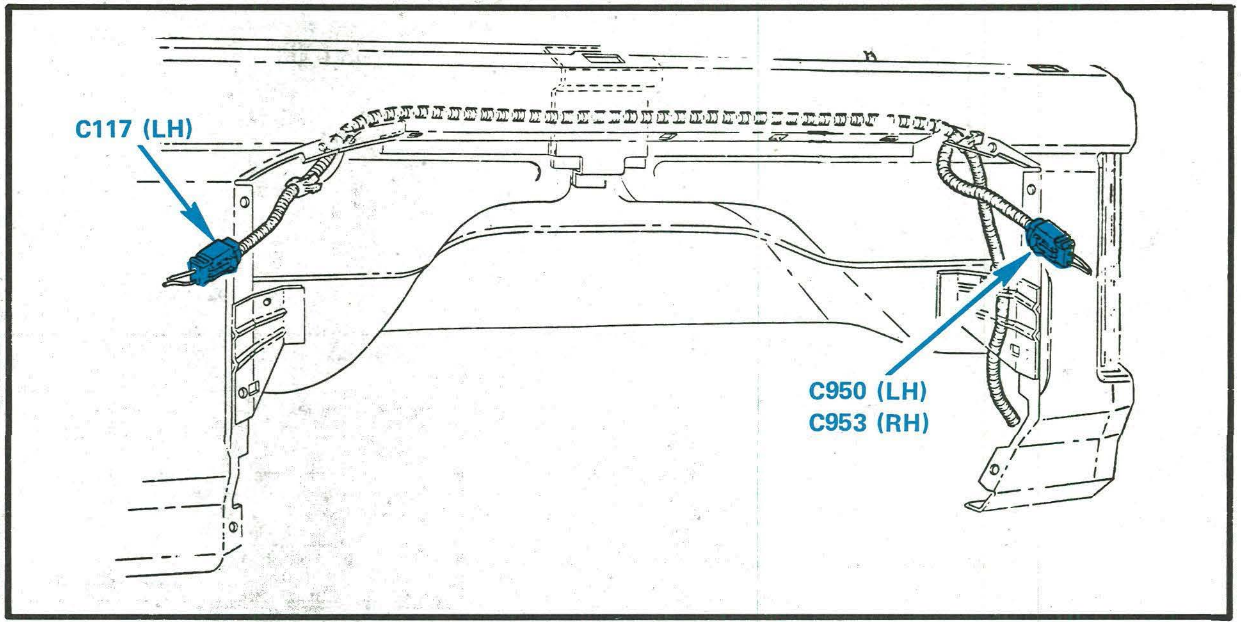


Figure 8—LH Rear Fender Well for Dual Wheels (RH Similar)

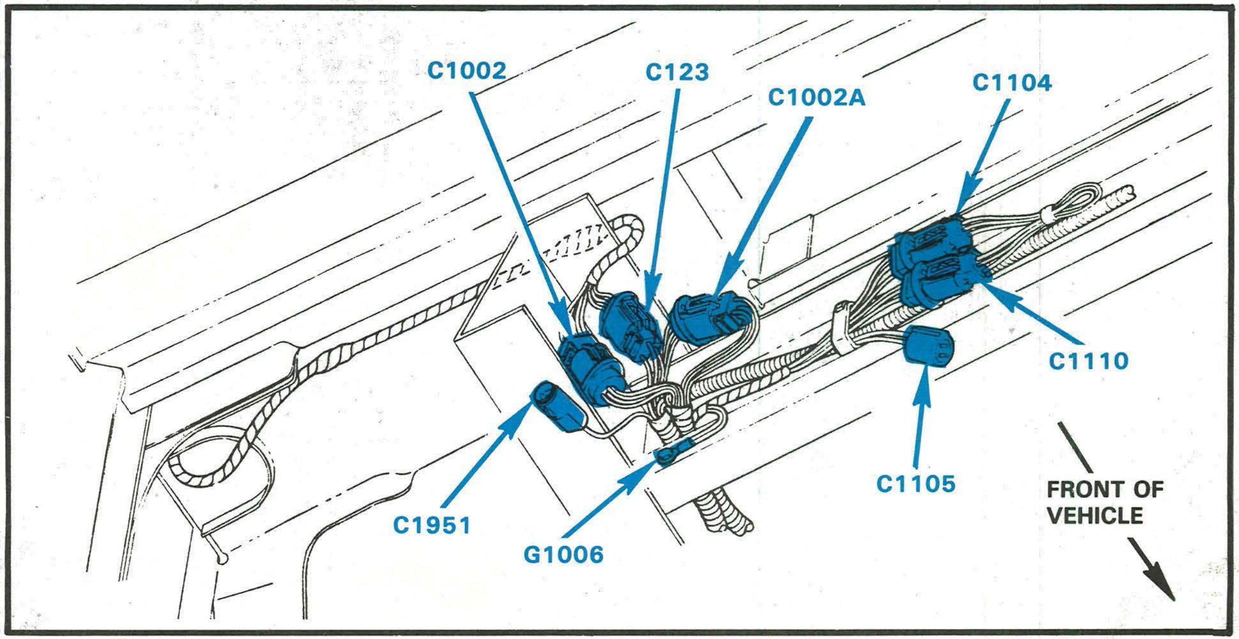
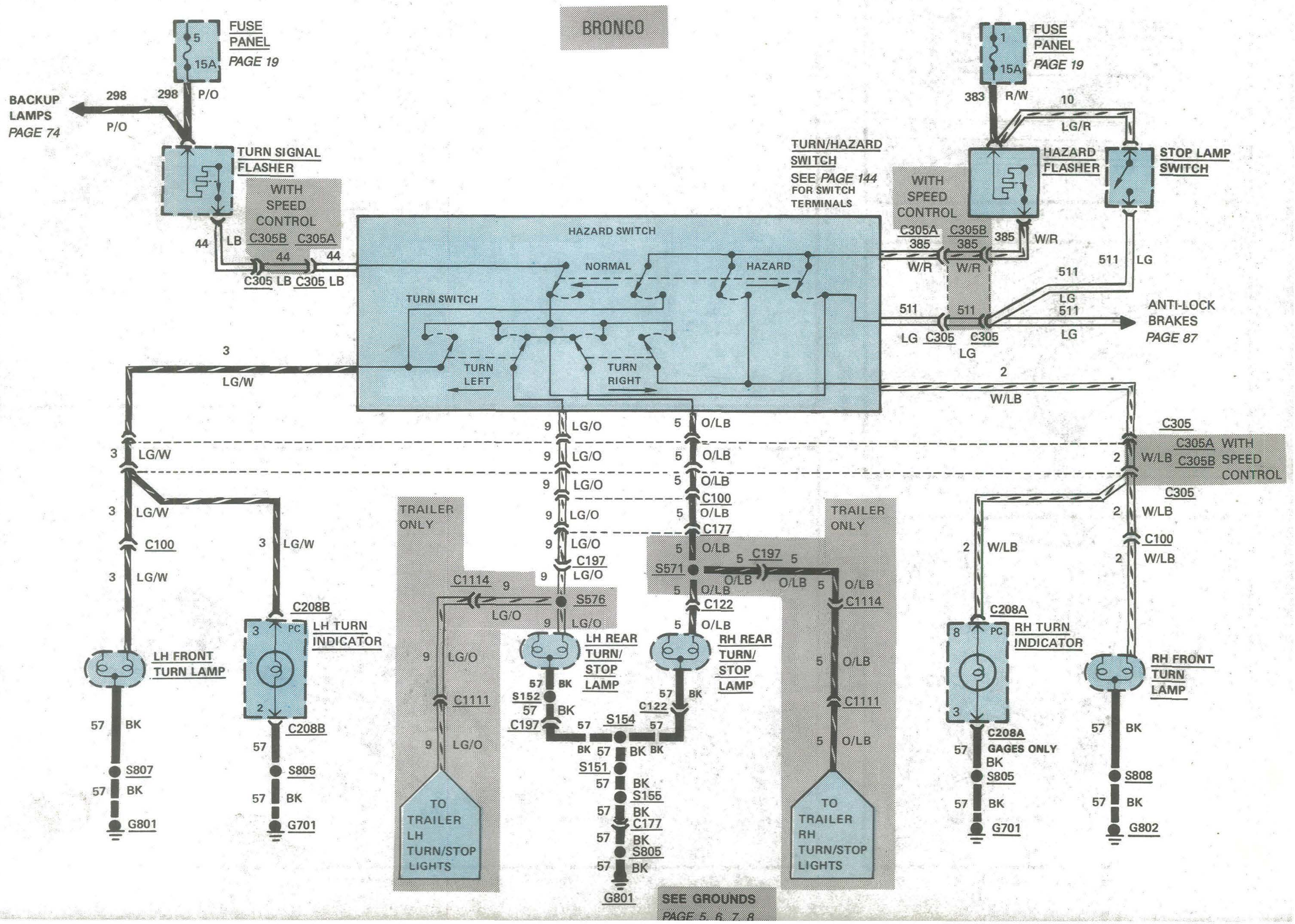
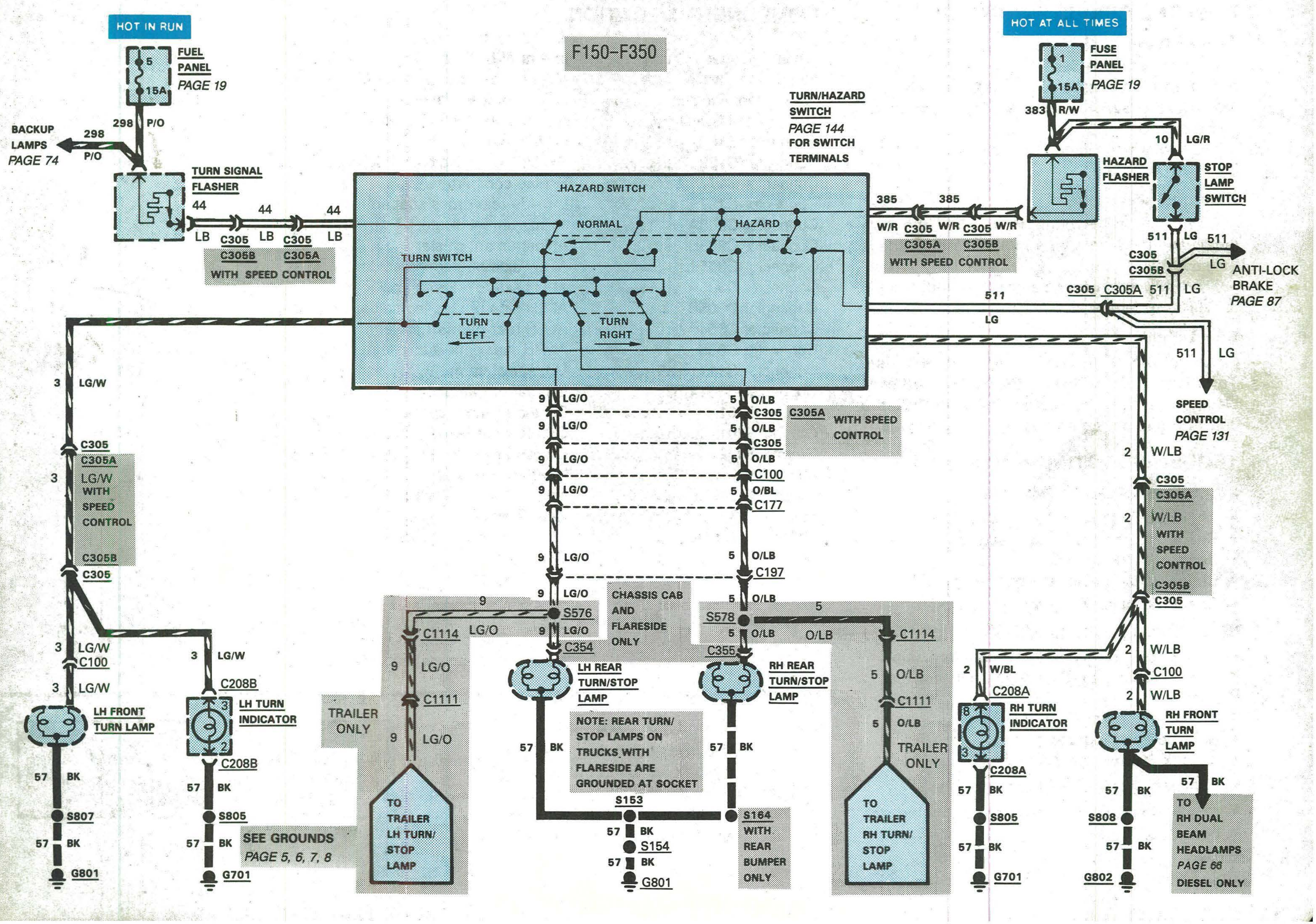


Figure 9—Rear LH Side Frame Crossmember

TURN/STOP/HAZARD LAMPS




F150–F350
HOT IN RUN
5
15A
FUEL PANEL
PAGE 19
298 P/O
BACKUP LAMPS
PAGE 74
298
P/O
TURN SIGNAL FLASHER
44
LB
C305
C305B
C305A
WITH SPEED CONTROL
TURN/HAZARD SWITCH
PAGE 144
FOR SWITCH TERMINALS
HAZARD SWITCH
NORMAL
HAZARD
TURN SWITCH
TURN LEFT
TURN RIGHT
HOT AT ALL TIMES
1
15A
FUSE PANEL
PAGE 19
383
R/W
10
LG/R
HAZARD FLASHER
STOP LAMP SWITCH
385
W/R
C305
C305A
C305B
WITH SPEED CONTROL
511
LG
ANTI-LOCK BRAKE
PAGE 87
C305
C305A
SPEED CONTROL
PAGE 131
3
LG/W
C305
C305A
WITH SPEED CONTROL
C305B
C100
9
LG/O
5
O/LB
O/BL
C305
C305A
WITH SPEED CONTROL
C100
C177
C197
CHASSIS CAB AND FLARESIDE ONLY
S576
S578
C354
C355
C1114
C1111
TRAILER ONLY
TO TRAILER LH TURN/ STOP LAMP
TO TRAILER RH TURN/ STOP LAMP
LH REAR TURN/STOP LAMP
RH REAR TURN/STOP LAMP
NOTE: REAR TURN/ STOP LAMPS ON TRUCKS WITH FLARESIDE ARE GROUNDED AT SOCKET
57
BK
S153
S154
S164
WITH REAR BUMPER ONLY
G801
LH FRONT TURN LAMP
S807
C208B
LH TURN INDICATOR
S805
G701
SEE GROUNDS
PAGE 5, 6, 7, 8
2
W/LB
W/BL
C208A
RH TURN INDICATOR
8
3
RH FRONT TURN LAMP
S808
G802
TO RH DUAL BEAM HEADLAMPS
PAGE 66
DIESEL ONLY

HOW THE CIRCUIT WORKS

Turn Signals

With the **Ignition Switch** in RUN, current can flow through **Fuse 5**, the **Turn Signal Flasher, Turn/Hazard Switch**, and on to the turn lamps and indicators.

The turn switch sends the power to either the LH or RH turn lamps.

Hazard Flasher

Current flows through **Fuse 1** to the turn lamps and indicators when the hazard switch is pulled out.

The turn switch sends current to both the RH and LH turn lamps at the same time.

Stop Lights

Current flows through **Fuse 1** to the **Rear Turn/Stop Lamps** when the **Stop Lamp Switch** is closed. The same rear lamps are used for stop and turn and are controlled by the turn switch.

TROUBLESHOOTING HINTS

HAZARD FLASHER DOESN'T WORK

- Check **Fuse 1** by operating **Stop Lamps**.
- Check voltage at **Hazard Flasher R/W** wire.
- Replace **Hazard Flasher.**
- Check voltage at **C305 W/R** wire.
- Check **Turn/Hazard Switch.**

NO TURN INDICATORS WORK

- Check **Fuse 5** by operating **Backup Lamps.**
- Check voltage of **Turn Signal Flasher P/O** wire.
- Check voltage at **C305 LB** wire.
- Replace **Turn Signal Flasher.**
- Check **Turn/Hazard Switch.**

NO FRONT OR REAR LAMPS

- Check that ground points are tight and not corroded.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Hazard Flasher	In rear of fuse panel			
Stop Lamp Switch	Mounted to bracket at top of brake pedal			
Turn Signal Flasher	In front of fuse panel	17-1		
Turn/Hazard Switch	Mounted in steering column			53
Connector C100	LH thru dash			53
Connector C122	RH side of rear cross support	68-3	BK	4
Connector C177	Engine compartment LH		GY	12
Connector C197	LH side rear cross support			
Connector C208A	At instrument cluster			14
Connector C208B	At instrument cluster			14
Connector C305	At LH side of steering column		GY	11
Connector C305A	At LH side of steering column		GY	11
Connector C305B	At LH side of steering column		GY	11
Connector C354	At LH rear park & turn lamp	68-4	BK	2
Connector C355	At RH rear park & turn lamp	68-4	BK	2
Connector C1111	LH rear of frame		BR	3
Connector C1114	LH rear of frame			3
Ground G701	Behind I/P near center			
Ground G801	On LH inner fender behind headlamp			
Ground G802	On RH inner fender behind headlamp			
Splice S151	Near license lamp T/O			
Splice S152	Near LH backup lamp T/O			
Splice S153	Near license lamp T/O			
Splice S154	Near front fuel/gage sender T/O			
Splice S164	Near license lamp T/O			
Splice S576	Near LH backup lamp T/O			
Splice S578	Near LH backup lamp T/O			
Splice S805	Near cigar lighter T/O			
Splice S807	Near LH head lamp T/O			
Splice S808	Near RH front park lamp T/O			

ONE TURN LAMP NOT OPERATING

- Check for burned-out bulb.
- Check voltage and ground at bulb socket.
- Check for frayed or damaged wires.
- Check that connectors are not corroded.
- Check **Turn/Hazard Switch.**

NOTE

Refer to Shop Manual for **Turn/Hazard Switch** test procedure or use Rotunda switch tester 014-00252 or equivalent.

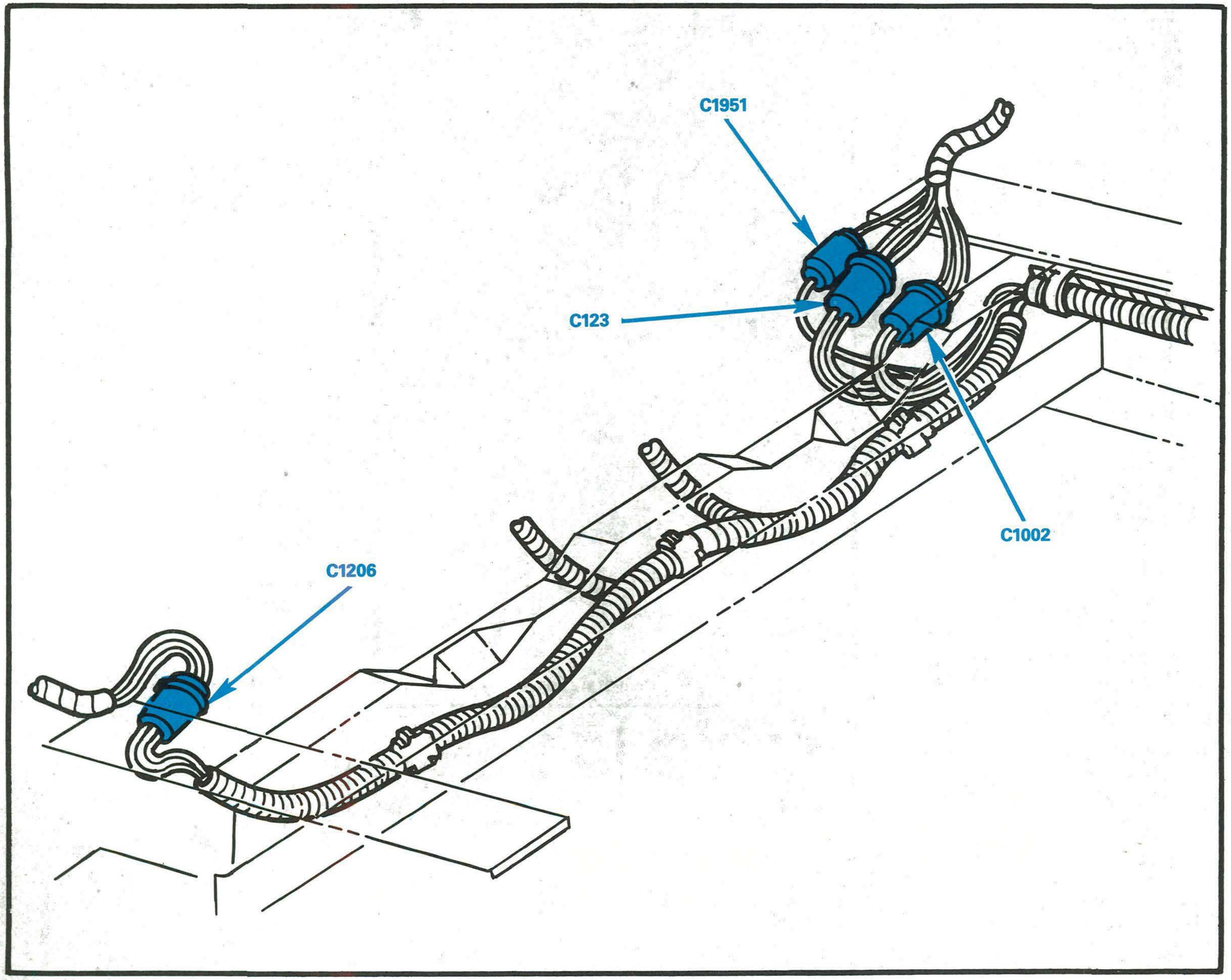
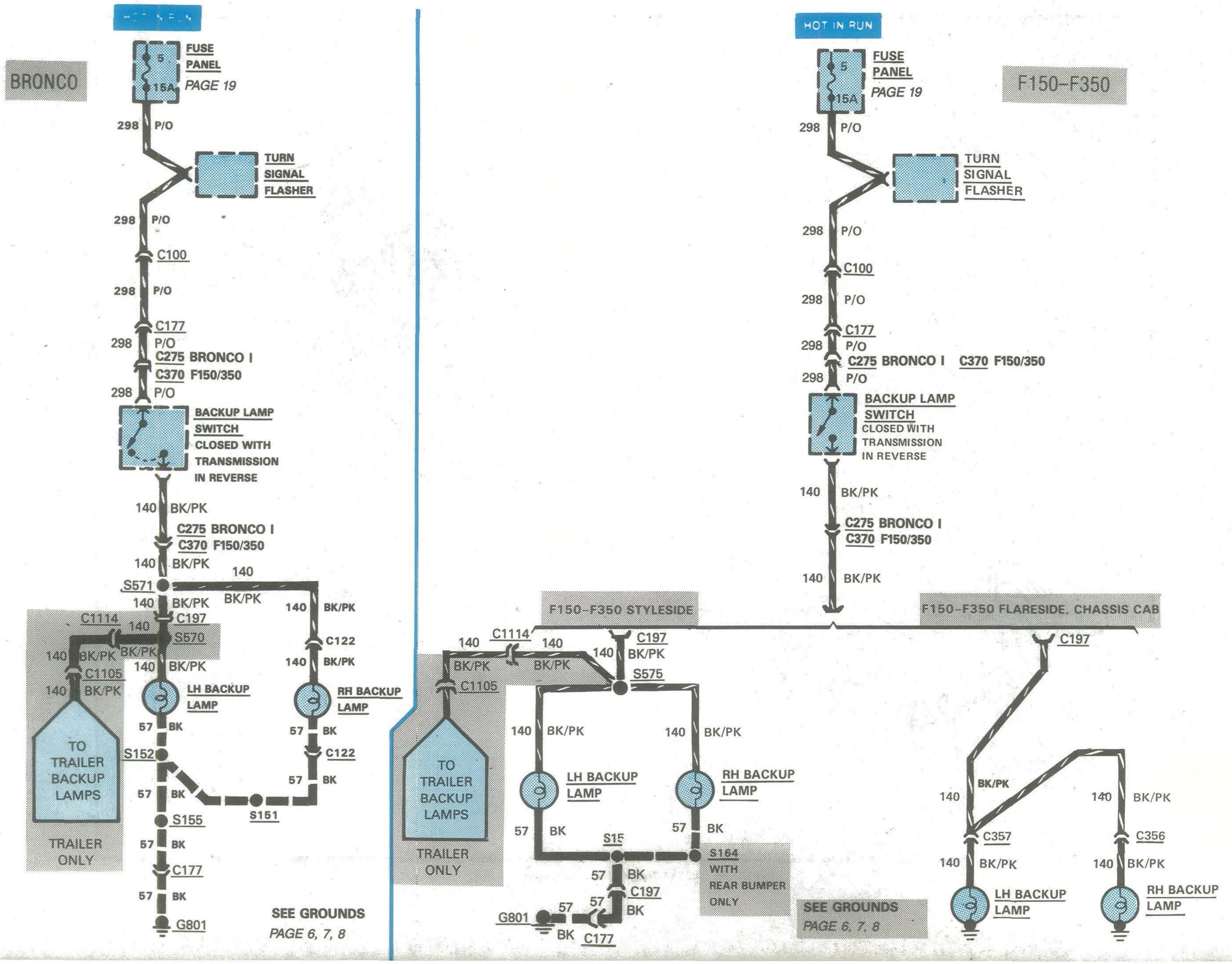


Figure 1—At Rear Crossmember

74 BACKUP LAMPS



TROUBLESHOOTING HINTS

NO BACKUP LAMPS WORK

- Check **Fuse 5** by operating the **Turn Lamps**.
- Separate **C275**. With gearshift in REVERSE, check continuity through switch at **BK/PK** wire.

ONE BACKUP LAMP WILL NOT WORK

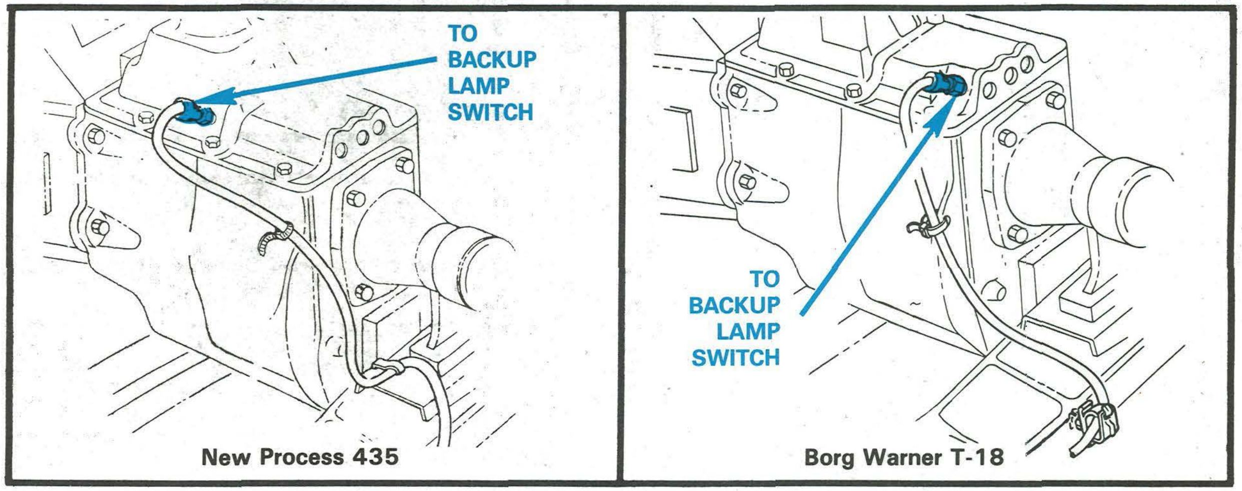
- Check bulb.
- Check socket for corrosion.
- Check voltage at socket hot pin.
- Check continuity to ground.

BACKUP LAMPS STAY ON

- Backup adjustment of switch.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Backup Lamp Switch	Park of manual transmission assembly or neutral safety switch	75-1		
Turn Signal Flasher	In front of fuse panel	17-1		
Connector C100	LH thru dash			53
Connector C122	RH side rear cross support	68-3	BK	4
Connector C177	Engine compartment LH		GY	12
Connector C197	LH side rear cross support			8
Connector C275	LH frame rail			8
Connector C356	At RH backup lamp	68-4	Y	1
Connector C357	At LH backup lamp	68-4	Y	1
Connector C370	LH frame rail		GY	4
Connector C1105	LH side of frame at rear crossmember	69-9	BK	2
Connector C1114	LH side of frame at rear crossmember			3
Ground G801	LH inner fender behind headlamp			
Splice S151	Near license lamp T/O			
Splice S152	Near LH backup lamp T/O			
Splice S570	Near fuel tank sender T/O			
Splice S571	Near fuel tank sender T/O			

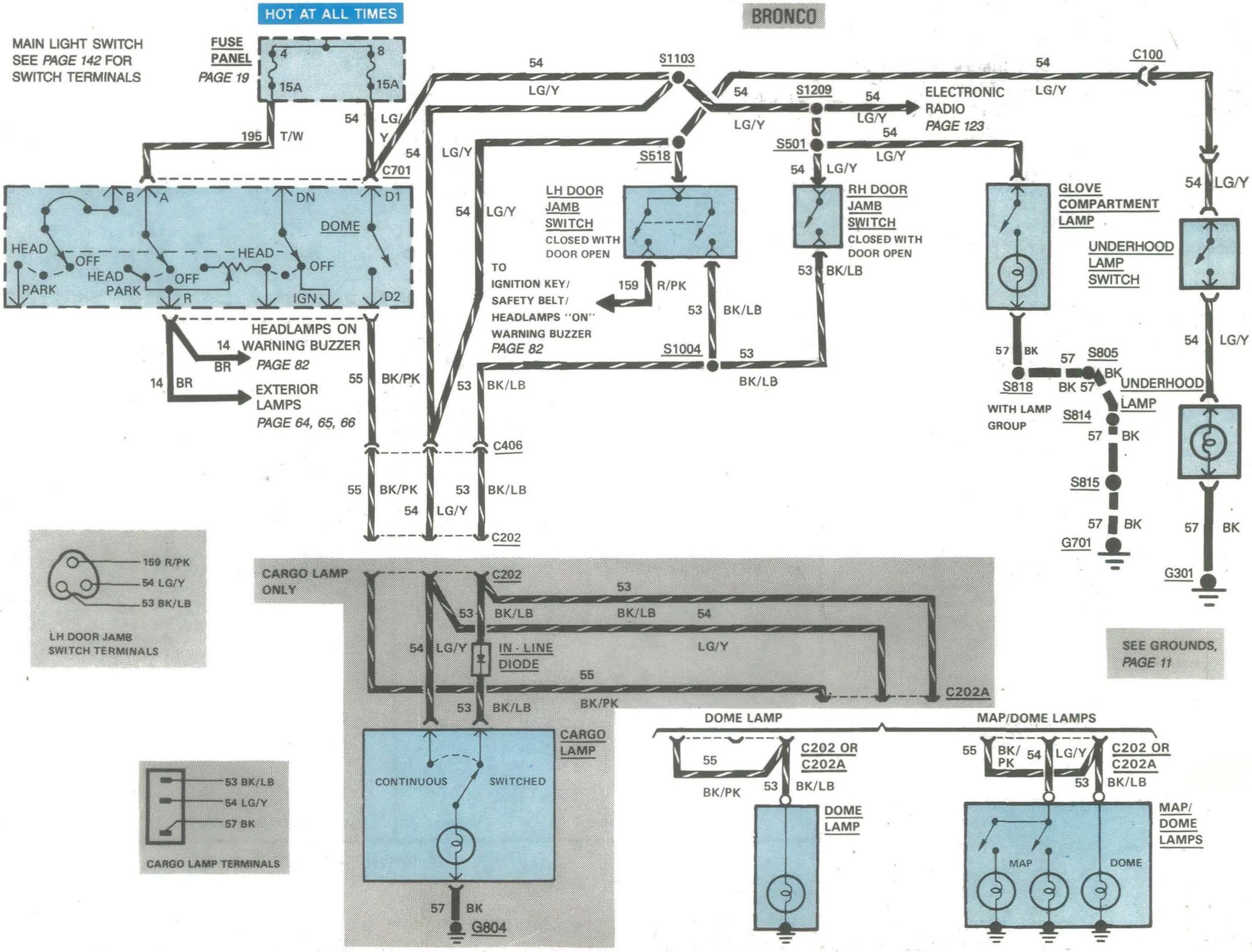


New Process 435

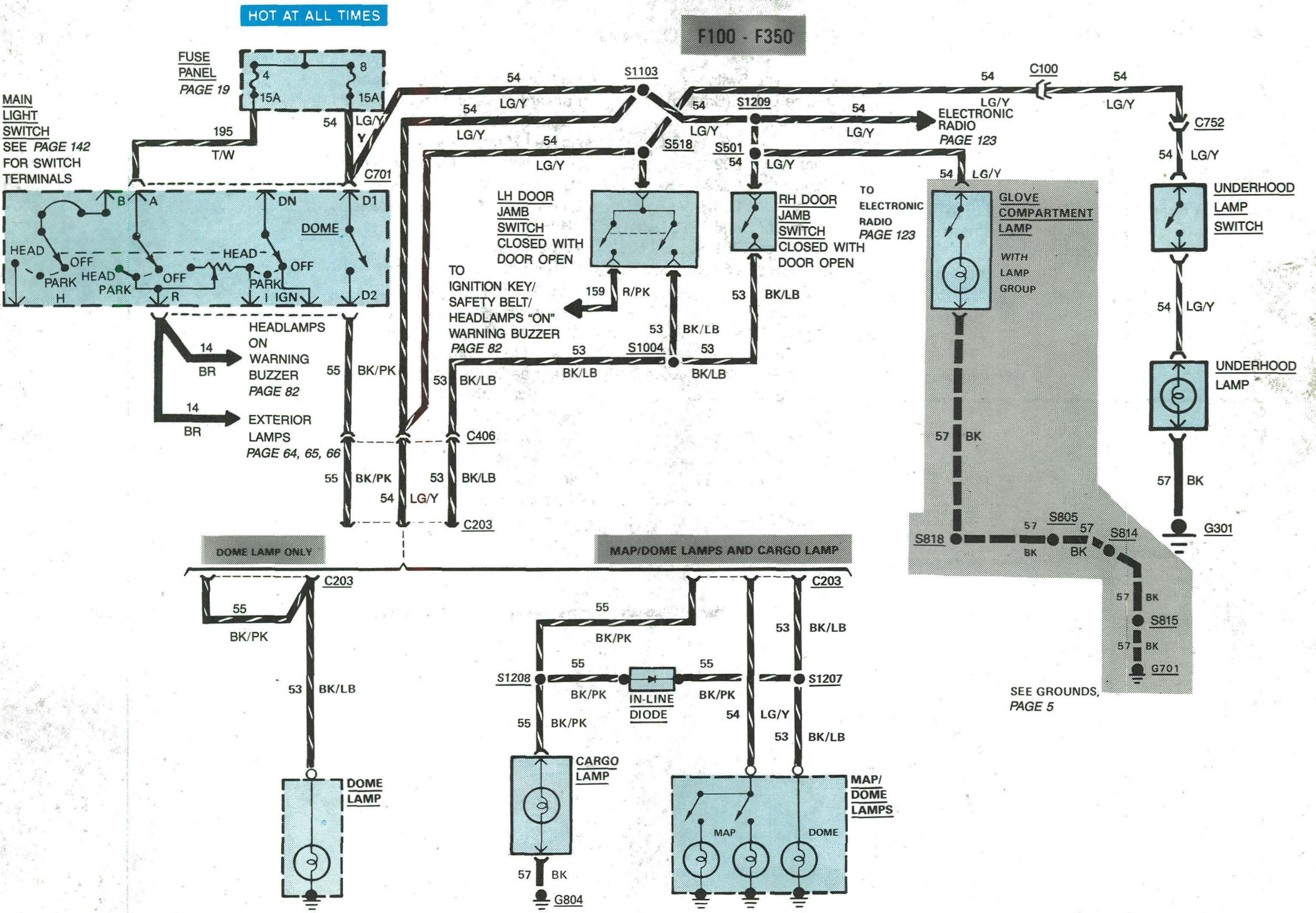
Borg Warner T-18

Figure 1 - Manual Transmissions

COURTESY/DOME/CARGO LAMPS/“LAMPS ON” WARNING



COURTESY/DOME/CARGO LAMPS/“LAMPS ON” WARNING



HOW THE CIRCUIT WORKS

Fuse 8 powers all the components in this circuit.

The **Lights On Warning Buzzer** sounds when there is voltage on both the **BR** and **R/PK** wires.

TROUBLESHOOTING HINTS

- Check **Fuse 8.** Check for short if fuse blows.
- Operate all switches to pinpoint trouble. Replace bulb if necessary.
- Check continuity of switches and wires.
- See troubleshooting chart "Courtesy Lamps - Improper Operation" in the Shop Manual.

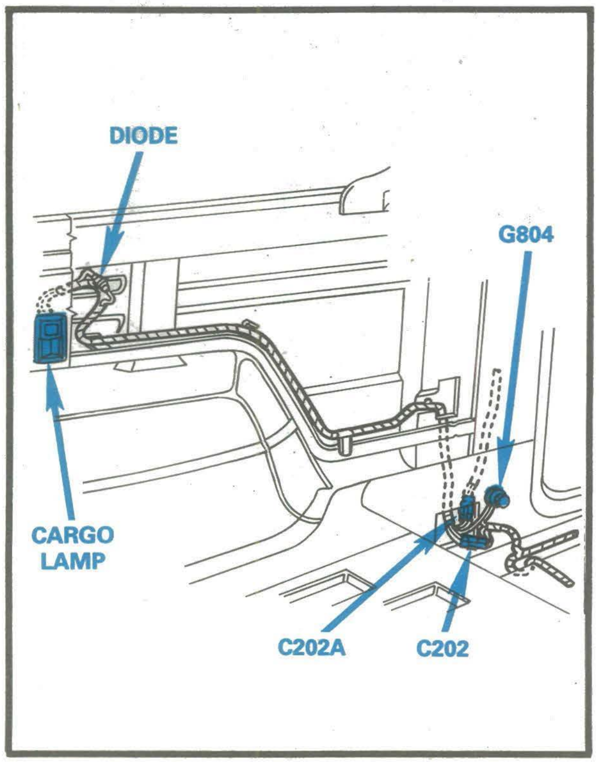


Figure 1 – Cargo Area of Bronco

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Door Jamp Switches	LH lower cowl, near fuse panel		GY	8
In-Line Diode (Bronco)	Forward of cargo lamp above LH rear wheelwell	78-1		
(F150-F350)	Above LH quarter window			
Connector C202	Lower hole of LH quarter panel	79-2, 3, 4	GY	3
Connector C202A	Lower hole of LH quarter panel	79-2, 3, 4	GY	3
Connector C203	Lower hole of LH quarter panel		GY	3
Connector C406	LH cowl		GY	4
Connector C701	At main light switch		BK	8
Connector C752	LH side of hood at engine compartment lamp		GY	1
Ground G701	Behind I/P near center			
Ground G804	At lower hole of LH quarter panel	78-1, 79-2, 3, 4		
Splice S501	Near RH courtesy lamp T/O			
Splice S518	Near headlamp dimmer switch T/O			
Splice S805	Near cigar lighter T/O			
Splice S1103	Near RH courtesy lamp T/O			
Splice S818	Near W/S/W washer switch T/O			
Splice S1004	Near ignition switch T/O			
Splice S1207	Near dome lamp T/O			
Splice S1208	Near dome lamp T/O			
Splice S1209	Near radio T/O			

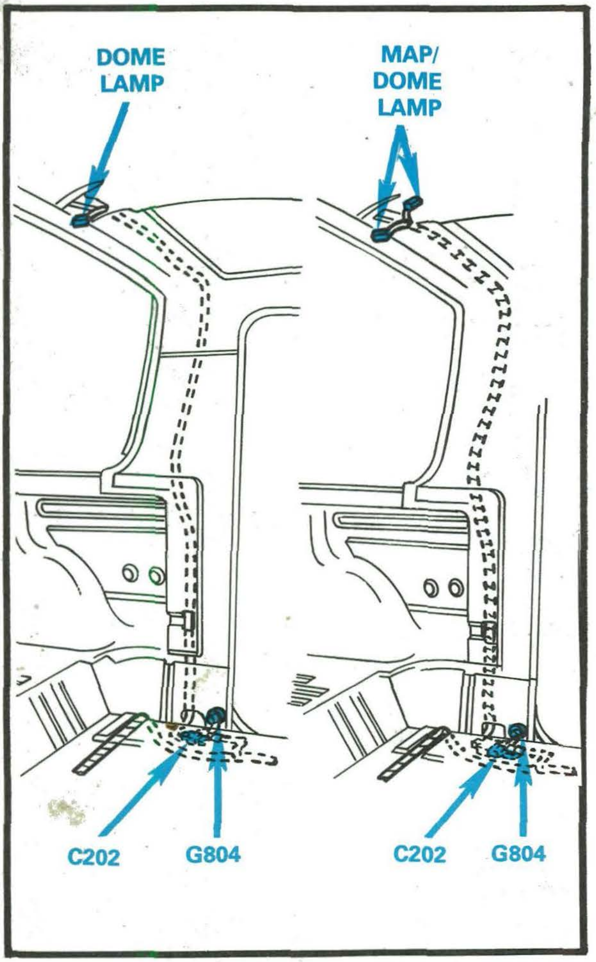


Figure 2 – Dome and Map/Dome Lamp Wiring (Bronco)

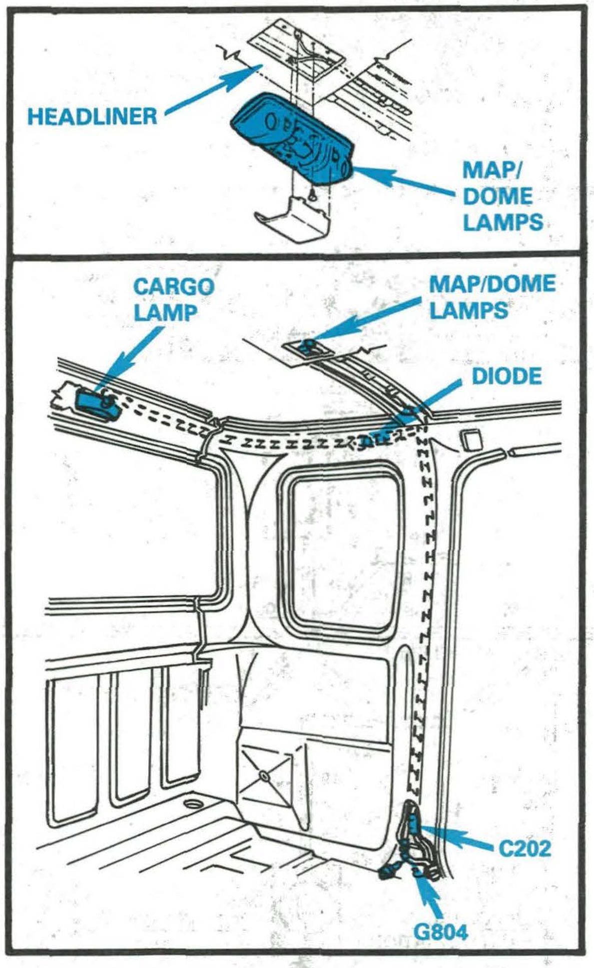


Figure 3 – LH Quarter Panel of Super Cab

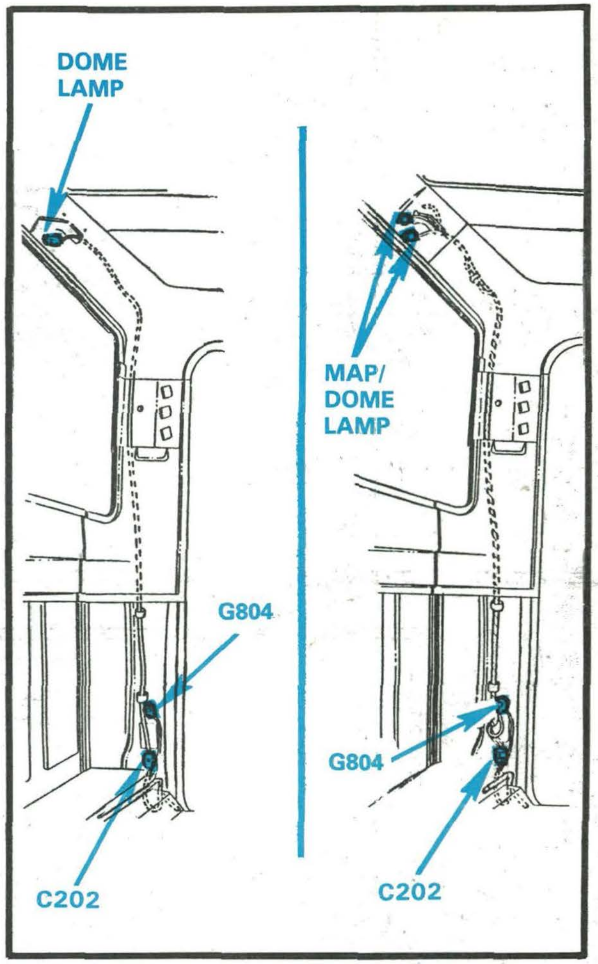
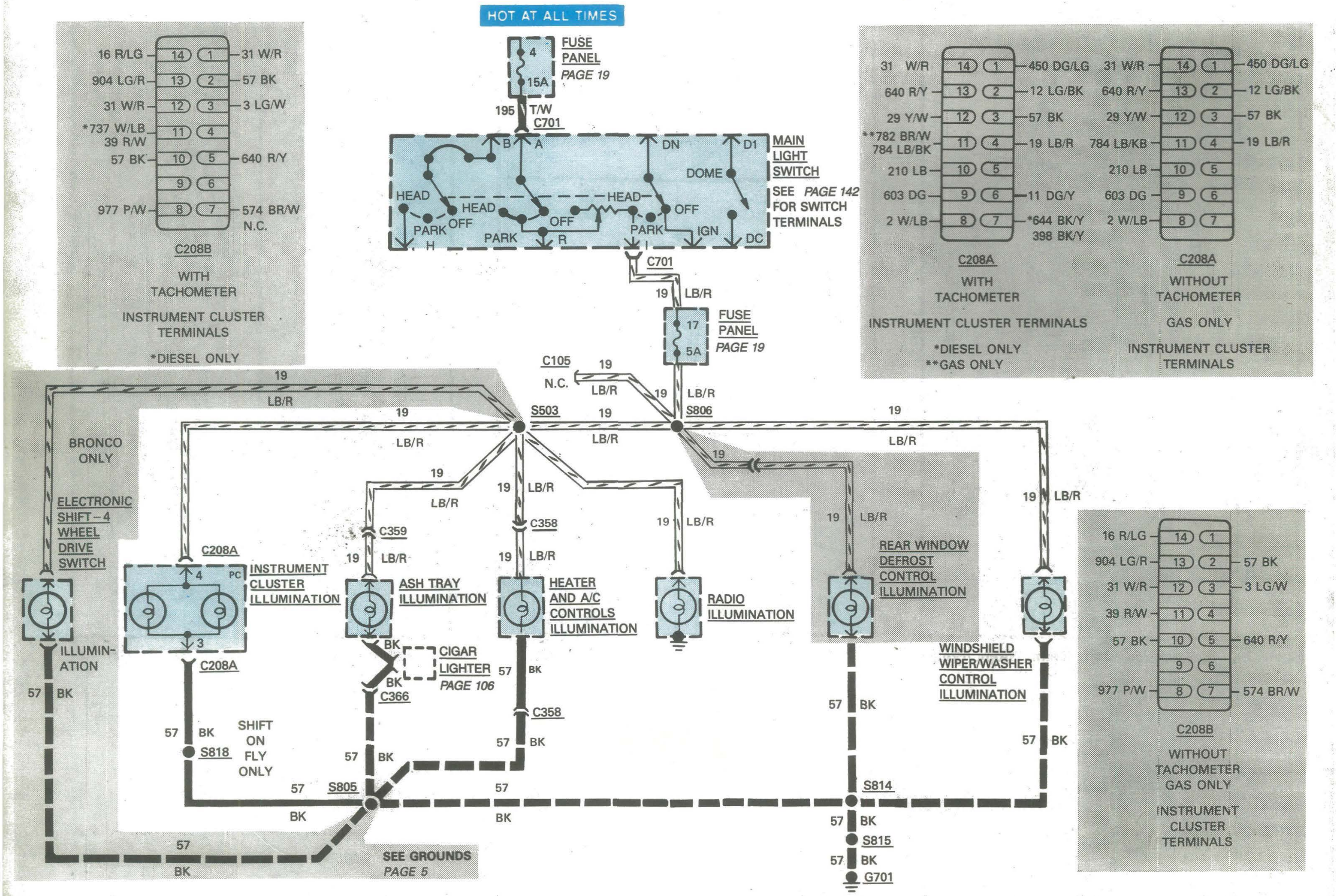


Figure 4 – LH Quarter Panel of Regular Cab

INSTRUMENT ILLUMINATION



TROUBLESHOOTING HINTS

NO INSTRUMENT LAMPS WORK

- If **Park Lamps** don't work, check **Fuse 17** and **Main Light Switch**.
- If **Park Lamps** work, check harness back to **Battery**.
- Disconnect **C701** and check resistance of dimmer.
- Check circuit connections.

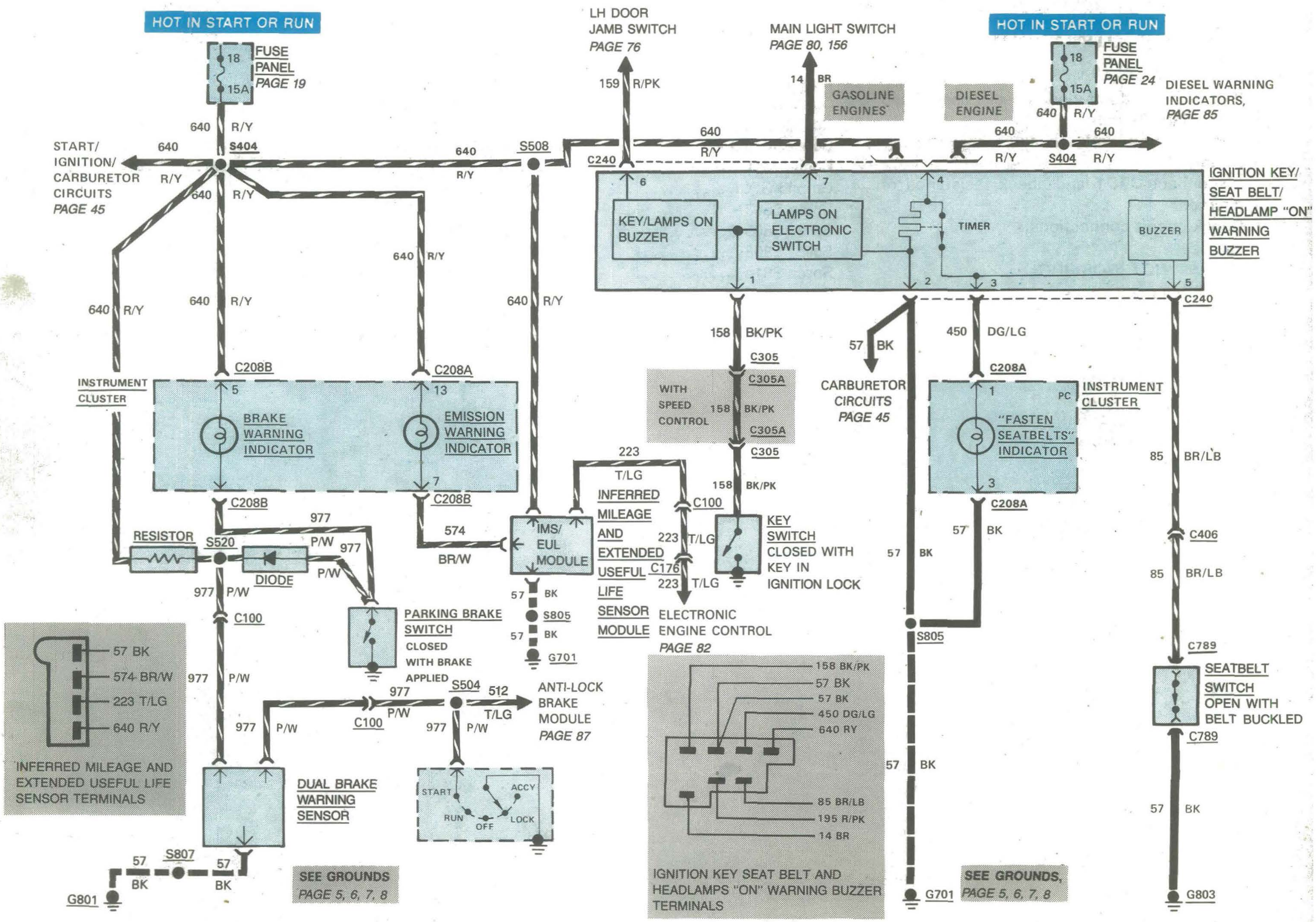
ONE LAMP NOT WORKING

- Check bulb and socket.
- Check continuity to ground.

COMPONENT LOCATION

COMPONENT LOCATION		Page-Figure	Color	Terminals
Connector C105	Engine compartment LH side at dash			
Connector C208A	At instrument cluster			14
Connector C358	Behind center of I/P		GY	2
Connector C366	Behind center of I/P		GY	3
Connector C701	At main light switch		BK	8
Ground G701	Behind I/P near center			
Splice S503	Near instrument cluster T/O			
Splice S805	Near cigar lighter T/O			
Splice S806	Near windshield wiper switch illumination T/O			
Splice S814	Near windshield wiper switch illumination T/O			
Splice S815	Near G701 T/O			
Splice S818	Near RH courtesy lamp T/O			

WARNING INDICATORS (BRAKE, OIL, IGNITION KEY, SEATBELT) (GASOLINE)


HOT IN START OR RUN
18
15A
FUSE PANEL PAGE 19
640 R/Y
START/ IGNITION/ CARBURETOR CIRCUITS PAGE 45
S404
S508
640 R/Y
LH DOOR JAMB SWITCH PAGE 76
159 R/PK
MAIN LIGHT SWITCH PAGE 80, 156
14 BR
GASOLINE ENGINES
DIESEL ENGINE
HOT IN START OR RUN
FUSE PANEL PAGE 24
DIESEL WARNING INDICATORS, PAGE 85
C240
IGNITION KEY/ SEAT BELT/ HEADLAMP "ON" WARNING BUZZER
KEY/LAMPS ON BUZZER
LAMPS ON ELECTRONIC SWITCH
TIMER
BUZZER
158 BK/PK
C305
C305A
WITH SPEED CONTROL
57 BK
CARBURETOR CIRCUITS PAGE 45
450 DG/LG
C208A
INSTRUMENT CLUSTER
PC
"FASTEN SEATBELTS" INDICATOR
85 BR/LB
C406
C789
SEATBELT SWITCH OPEN WITH BELT BUCKLED
G803
INSTRUMENT CLUSTER
C208B
BRAKE WARNING INDICATOR
EMISSION WARNING INDICATOR
574 BR/W
IMS/ EUL MODULE
223 T/LG
C100
C176
INFERRED MILEAGE AND EXTENDED USEFUL LIFE SENSOR MODULE
ELECTRONIC ENGINE CONTROL PAGE 82
KEY SWITCH CLOSED WITH KEY IN IGNITION LOCK
RESISTOR
S520
977 P/W
DIODE
PARKING BRAKE SWITCH CLOSED WITH BRAKE APPLIED
S805
G701
S504
512 T/LG
ANTI-LOCK BRAKE MODULE PAGE 87
START
ACCY
RUN
OFF
LOCK
DUAL BRAKE WARNING SENSOR
S807
G801
SEE GROUNDS PAGE 5, 6, 7, 8
57 BK
574 BR/W
223 T/LG
640 R/Y
INFERRED MILEAGE AND EXTENDED USEFUL LIFE SENSOR TERMINALS
158 BK/PK
57 BK
57 BK
450 DG/LG
640 RY
85 BR/LB
195 R/PK
14 BR
IGNITION KEY SEAT BELT AND HEADLAMPS "ON" WARNING BUZZER TERMINALS
SEE GROUNDS, PAGE 5, 6, 7, 8

WARNING INDICATORS

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in RUN or START, the **Oil Pressure Warning Indicator** comes on if the oil pressure is too low.

The **Brake Warning Indicator** goes on: -

1. With the **Ignition Switch** in START, to test the bulb. (This connection is closed just before the **Starter Relay** pulls in.)
2. When the brakes are applied and either front or rear brake system has failed (low pressure).
3. When the **Parking Brake Switch** closes.

TROUBLESHOOTING HINTS

ANY WARNING INDICATOR STAYS ON WHEN SYSTEMS ARE NORMAL

- Check for faulty switch.
- Check for shorts to ground in wiring between **Instrument Cluster** and any switch.

WARNING INDICATOR DOESN'T GO ON

- Check bulb. Check continuity from printed circuit to ground.
- Check for voltage at **R/Y** wire at **C208.**
- Remove and check **Instrument Cluster** printed circuit.
- Check for faulty switch.

SEATBELT WARNING

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in RUN, current flows through **Fuse 18,** and the **"Fasten Belts" Indicator** for 4 to 8 seconds, whether belts are buckled or not. The buzzer will sound during this time only if the driver's belt is not buckled.

A thermal time switch in the **Seatbelt Warning Buzzer** assembly controls both the indicator and buzzer.

COMPONENT LOCATION		Page-Figure	Color	Terminals
Brake Sensor	LH fender apron near master cylinder			
Brake Warning Indicator	Part of instrument cluster			
Emission Warning Indicator	Upper left instrument panel			
Extended Useful Life Sensor	Attached to instrument panel to left of steering column			
Ignition Switch	Attached to steering column			
Key Switch	Part of ignition switch			
Parking Brake Switch	On parking brake bracket	84-2		
Seatbelt Switch	In driver's seatbelt buckle			
Seatbelt Warning Buzzer	Attached to rear RH side of I/P			
Connector C100	LH thru dash			53
Connector C176	Engine compartment LH side			8
Connector C208A	At instrument cluster			14
Connector C208B	At instrument cluster			14
Connector C240	At ignition key, seat belt warning buzzer			7
Connector C305	At LH side of steering column		GY	11
Connector C305A	At LH side of steering column		GY	11
Connector C406	LH cowl under I/P		GY	4
Connector C789	LH side of driver's seat on floor pan	84-1	GY	2
Ground G701	Behind I/P near center			
Ground G801	LH inner fender behind headlamp			
Ground G804	At lower hole of LH quarter panel			
Splice S404	Near clutch switch T/O			
Splice S805	Near cigar lighter T/O			
Splice S504	Near instrument cluster T/O			
Splice S508	Near warning buzzer T/O			
Splice S517	Near LH courtesy lamp T/O			
Splice S520	Near warning buzzer T/O			
Splice S807	Near LH headlamp T/O			

TROUBLESHOOTING HINTS

NO SEATBELT WARNING INDICATOR BUZZER OPERATION

- Check **Fuse 18** by operating **Brake Warning Indicator.**
- Check for voltage at **R/Y** wire of buzzer.

INDICATOR DOESN'T GO ON

- Check indicator bulb.
- Check for voltage at **DG/LG** wire of **C208A** when buzzer is on.
- Check continuity from **BK** wire of **C208A** to **G701.**
- Remove and check buzzer.

BUZZER DOES NOT SOUND

- Check for continuity to ground at **BR/LB** wire of buzzer.
- Check for voltage on **R/Y** wire at buzzer.
- Remove and check buzzer.

KEY WARNING

HOW THE CIRCUIT WORKS

Voltage is applied at all times through **Fuse 8** to this circuit. The **Key Warning Switch** and other components on this circuit are connected to the **Front Door Jamb Switches.** When the **LH Front Door Jamb Switch** is opened, voltage is available to turn on the **Key Warning Buzzer**.

TROUBLESHOOTING HINTS

KEY WARNING BUZZER DOES NOT SOUND

- If seatbelt warning does not sound, check connection at **Dual Warning Buzzer**.
- Disconnect **C305**. Apply ground to male pin of **BK/PK** wire. If buzzer sounds, check **Key Warning Switch** and ground path through **Main Light Switch.**
- Check voltage at **LH Front Door Jamb Switch**. Check continuity of switch.

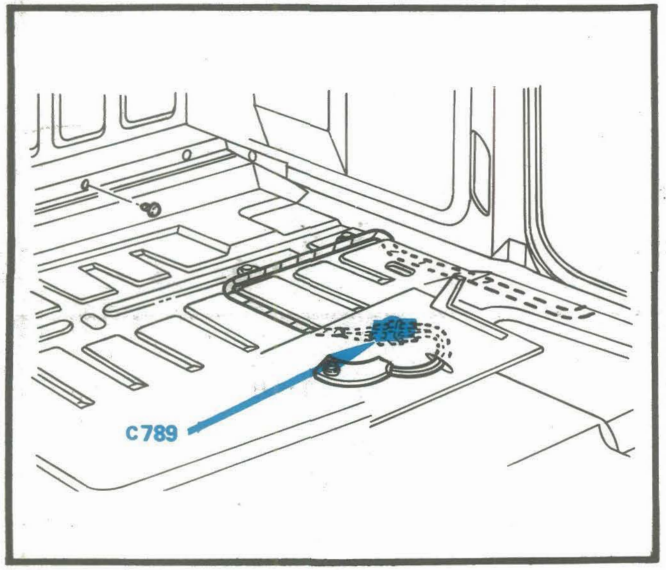


Figure 1– Seat Belt Wiring (Super Cab)

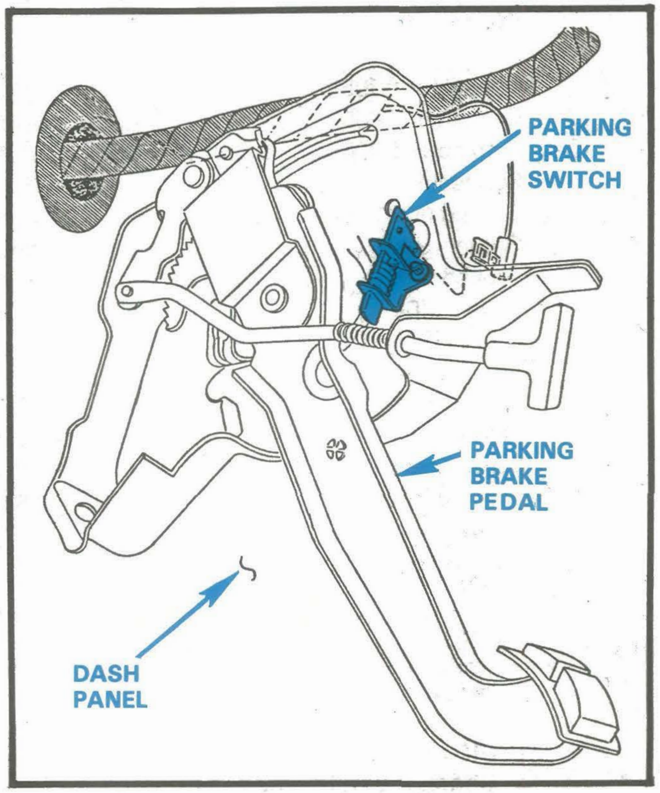
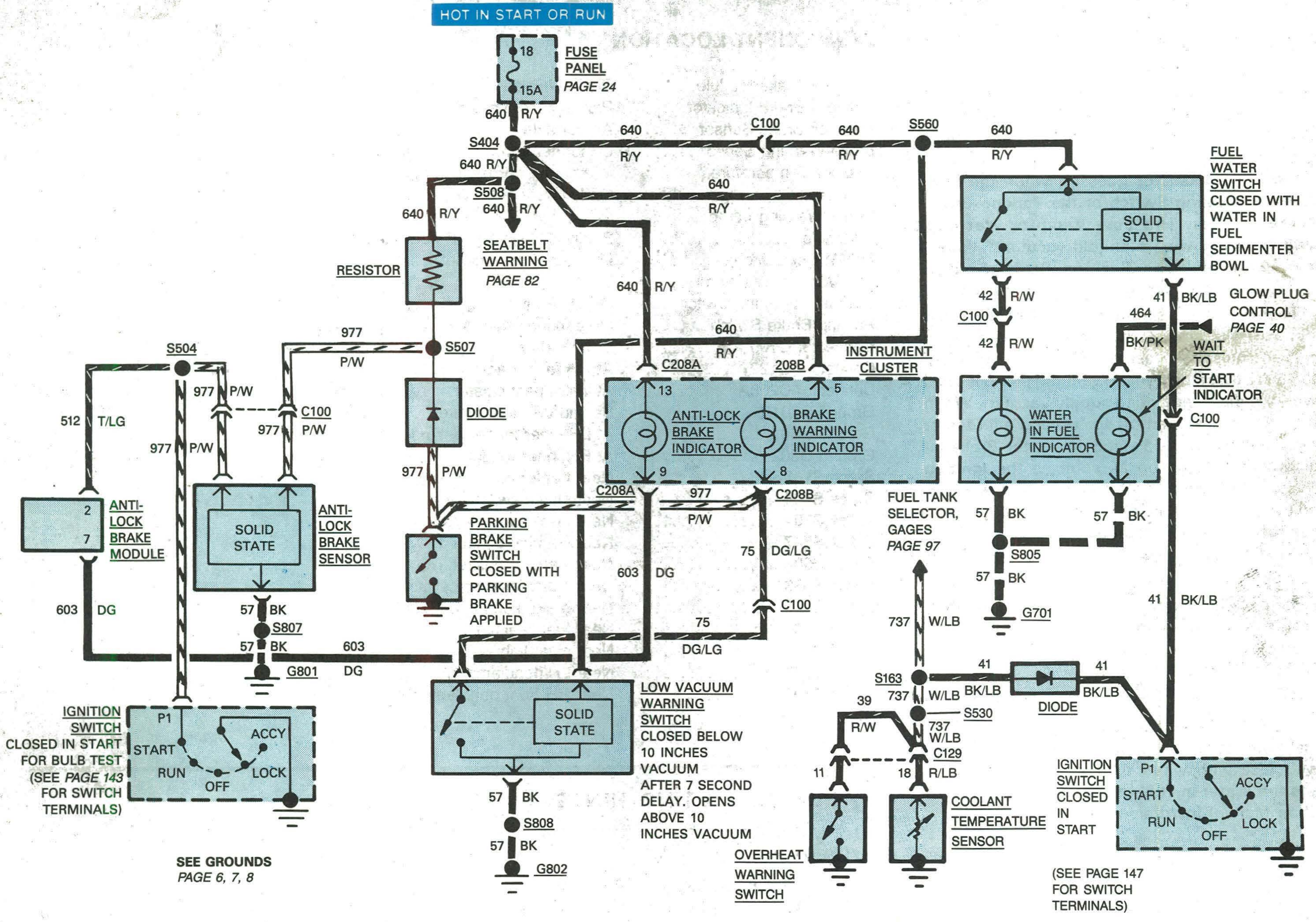


Figure 2– Under Dash Panel


HOT IN START OR RUN
18
15A
FUSE PANEL
PAGE 24
640 R/Y
S404
640
R/Y
C100
640
R/Y
S560
640
R/Y
640 R/Y
S508
640 R/Y
640 R/Y
SEATBELT WARNING
PAGE 82
640
R/Y
RESISTOR
640 R/Y
FUEL WATER SWITCH CLOSED WITH WATER IN FUEL SEDIMENTER BOWL
SOLID STATE
42 R/W
C100
42 R/W
41 BK/LB
GLOW PLUG CONTROL
PAGE 40
464
BK/PK
WAIT TO START INDICATOR
640
R/Y
INSTRUMENT CLUSTER
977
P/W
S507
S504
C208A
208B
13
5
ANTI-LOCK BRAKE INDICATOR
BRAKE WARNING INDICATOR
9
8
WATER IN FUEL INDICATOR
C100
977 P/W
C100
977 P/W
512 T/LG
977 P/W
DIODE
977 P/W
C208A
977
P/W
C208B
2
7
ANTI-LOCK BRAKE MODULE
SOLID STATE
ANTI-LOCK BRAKE SENSOR
PARKING BRAKE SWITCH CLOSED WITH PARKING BRAKE APPLIED
75 DG/LG
603 DG
FUEL TANK SELECTOR, GAGES
PAGE 97
57 BK
57 BK
S805
57 BK
G701
41 BK/LB
603 DG
57 BK
S807
57 BK
603
G801
DG
C100
75
DG/LG
737 W/LB
S163
41
41
737 W/LB
BK/LB
DIODE
BK/LB
39
S530
R/W
737 W/LB
C129
11
18 R/LB
IGNITION SWITCH CLOSED IN START FOR BULB TEST (SEE PAGE 143 FOR SWITCH TERMINALS)
P1
START
ACCY
RUN
OFF
LOCK
SOLID STATE
LOW VACUUM WARNING SWITCH CLOSED BELOW 10 INCHES VACUUM AFTER 7 SECOND DELAY. OPENS ABOVE 10 INCHES VACUUM
57 BK
S808
57 BK
G802
OVERHEAT WARNING SWITCH
COOLANT TEMPERATURE SENSOR
IGNITION SWITCH CLOSED IN START
P1
START
ACCY
RUN
OFF
LOCK
(SEE PAGE 147 FOR SWITCH TERMINALS)
SEE GROUNDS
PAGE 6, 7, 8

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in START or RUN, the **Diesel Warning Indicators** are powered through **Fuse 18**. With the **Ignition Switch** in START, the indicators are grounded for a bulb test.

The **Brake Indicator** goes on when the **Low Vacuum Warning Switch** or the **Parking Brake Switch** closes. The **Low Vacuum Warning Switch** closes when manifold vacuum falls below 10 inches. The **Parking Brake Switch** closes when the parking brake is engaged.

There is a 7-second delay after the **Low Vacuum Warning Switch** opens or closes to prevent nuisance flashing of the Brake Indicator. Note that a belt driven vacuum pump is used with the diesel engine to supply vacuum. When the engine has been off for several minutes or more and vacuum has bled down, the **Brake Indicator** will come on as soon as the **Ignition Switch** is turned to RUN. The indicator will stay on even after the engine is started until vacuum has reached a normal level.

CAUTION

Do not drive vehicle until the brake indicator goes out. Greatly increased pedal effort is required to stop without vacuum assistance for the brakes.

The **Fuel Water Switch** senses water in the fuel/water separator sediment blow. The switch will close with water in the sedimentor bowl and the **Water-In-Fuel Indicator** will go on. See Shop Manual for draining instructions.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Anti-lock Brake Module	Behind I/P left of center			
Anti-lock Brake Indicator	Part of instrument cluster			
Anti-lock Brake Sensor	At rear axle			
Brake Warning Sensor	LH fender apron near master cylinder			
Coolant Temperature Sensor	On LH front of Engine	44-1		
Diesel/Warning Lamp Module	Behind LH side of I/P near fuse panel			
Fuel Water Switch	LH side of dash panel			
Low Vacuum Warning				
Overheat Warning Switch	On LH front of engine	44-1		
Parking Brake Switch	On parking brake bracket	84-2		
Connector C100	LH thru dash			53
Connector C129	At RH fender apron	43-1	GY	8
Connector C208A	At instrument cluster			114
Ground G701	Behind I/P, near center			
Ground G801	At LH inner fender behind headlamp			
Ground G802	At RH inner fender behind headlamp	19-1		
Splice S163	Near heater control switch T/O			
Splice S404	Near clutch switch T/O			
Splice S504	Near instrument cluster T/O			
Splice S507	Near warning buzzer T/O			
Splice S508	Near warning buzzer T/O			
Splice S530	Near clutch interlock switch T/O			
Splice S550	Near brake sensor T/O			
Splice S560	Near fuel sedimentor water switch			
Splice S805	Near cigar lighter T/O			
Splice S807	Near LH headlamp T/O			
Splice S808	Near RH front park lamp T/O			

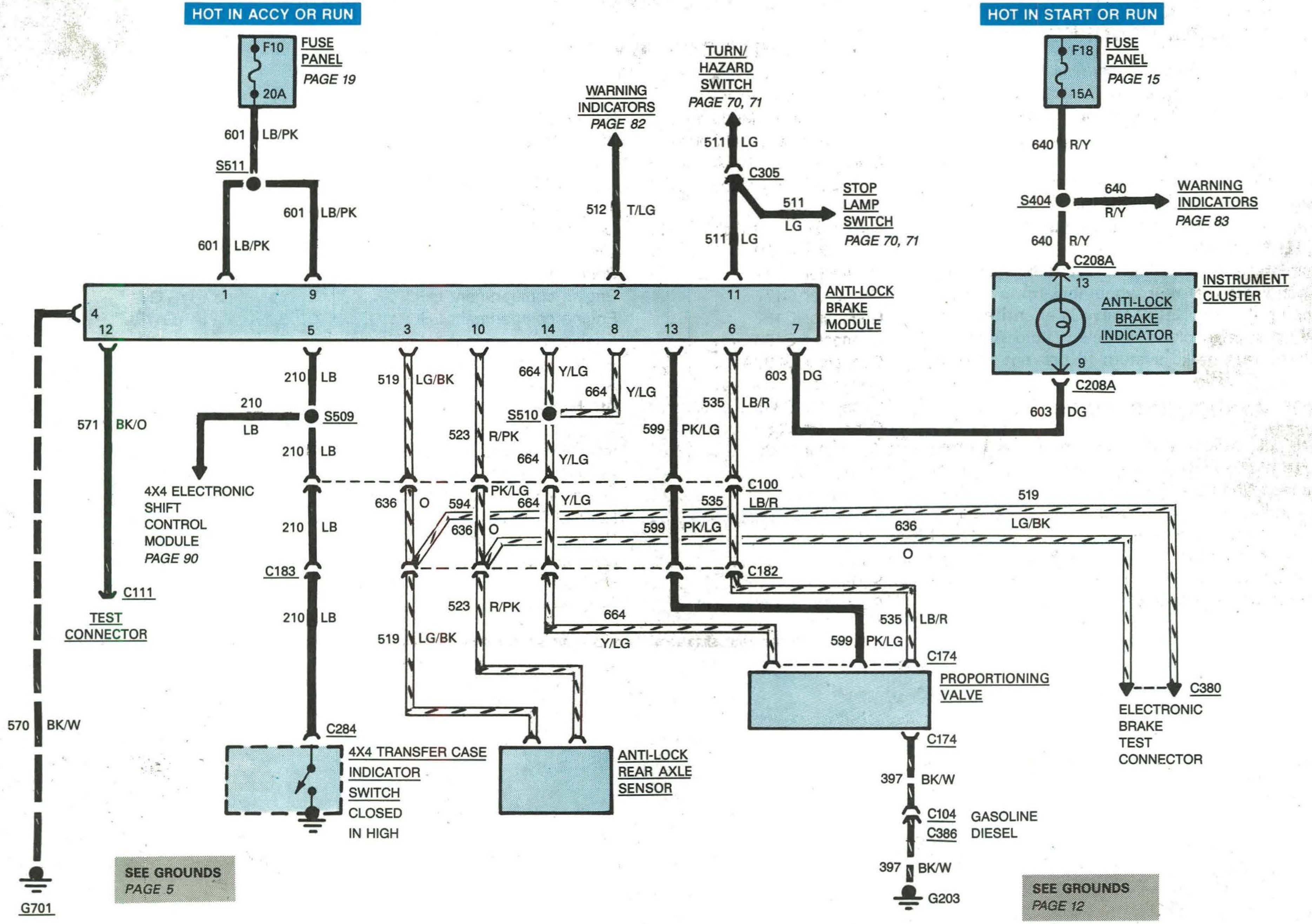
TROUBLESHOOTING HINTS

ANY WARNING INDICATOR STAYS ON WHEN SYSTEMS ARE NORMAL

- Check for faulty switch.
- Check for shorts to ground in wiring between warning bulb and switch.

ANY WARNING INDICATOR DOESN'T GO ON

- Check bulb. Check continuity from warning bulb to ground.
- Check for voltage at **R/Y** wire at affected bulb with **Ignition Switch** in RUN.



SEE GROUNDS
PAGE 5

SEE GROUNDS
PAGE 12

HOW THE CIRCUIT WORKS

The **Anti-lock Brake System** is powered thru **Fuse 10** with the **Ignition Switch** in ACCY or RUN. The **Anti-lock Indicator** is powered thru **Fuse 18.**

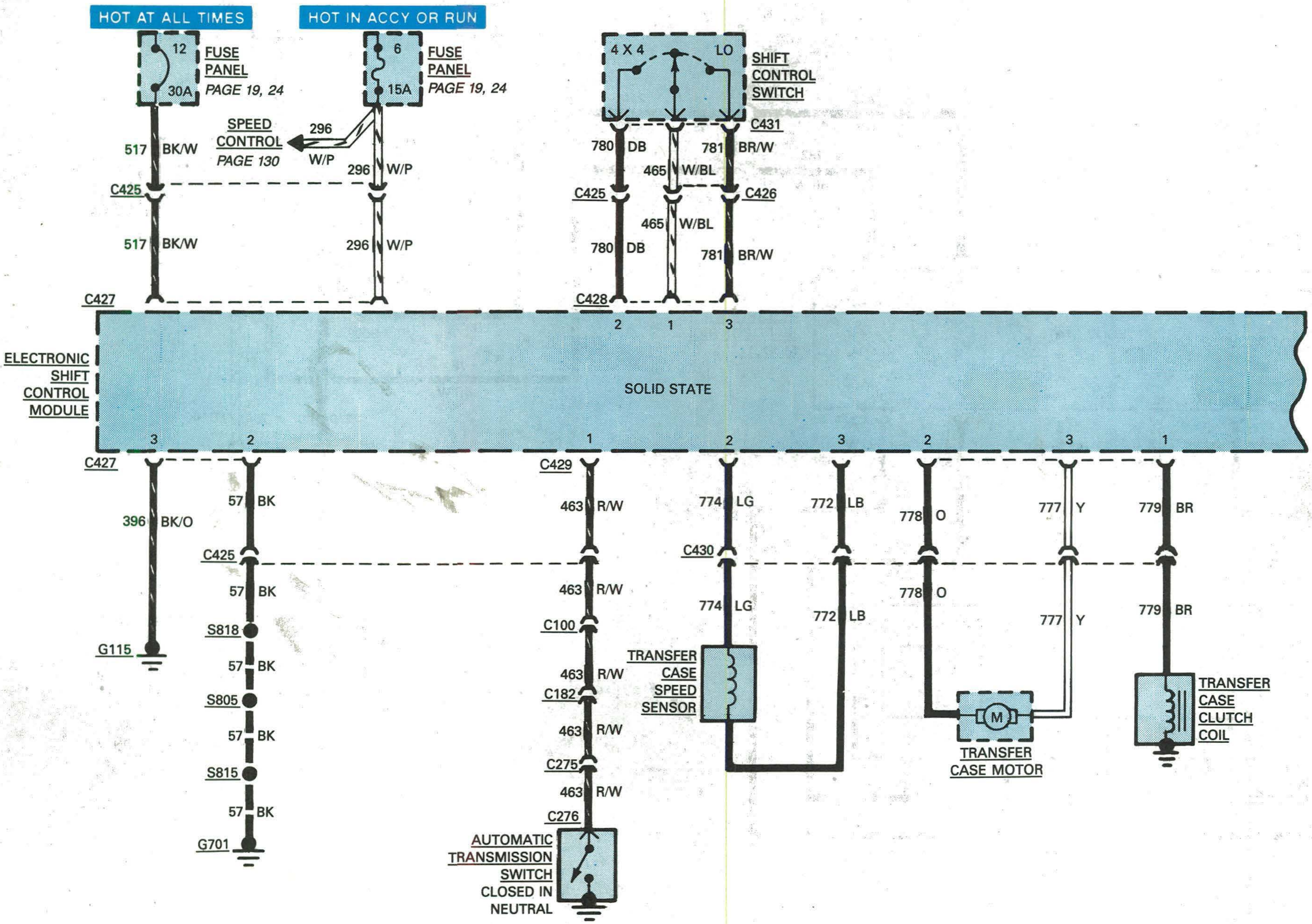
The **Anti-lock Brake Module** processes signals from the **Rear Axle Sensor, Stop Lamp Switch** and **4 Wheel Drive Indicator Switch** to energize the **Electronic Rear Brake Proportioning (ERBP) Valve** to first isolate the **Rear Wheel Cylinders** from the **Master Cylinder**. If the signals indicate that rear wheel lock-up is still impending then the **ERBP Valve** is energized with rapid pulses to bleed sufficient fluid from the isolated rear brake system to prevent lock-up.

TROUBLESHOOTING HINTS

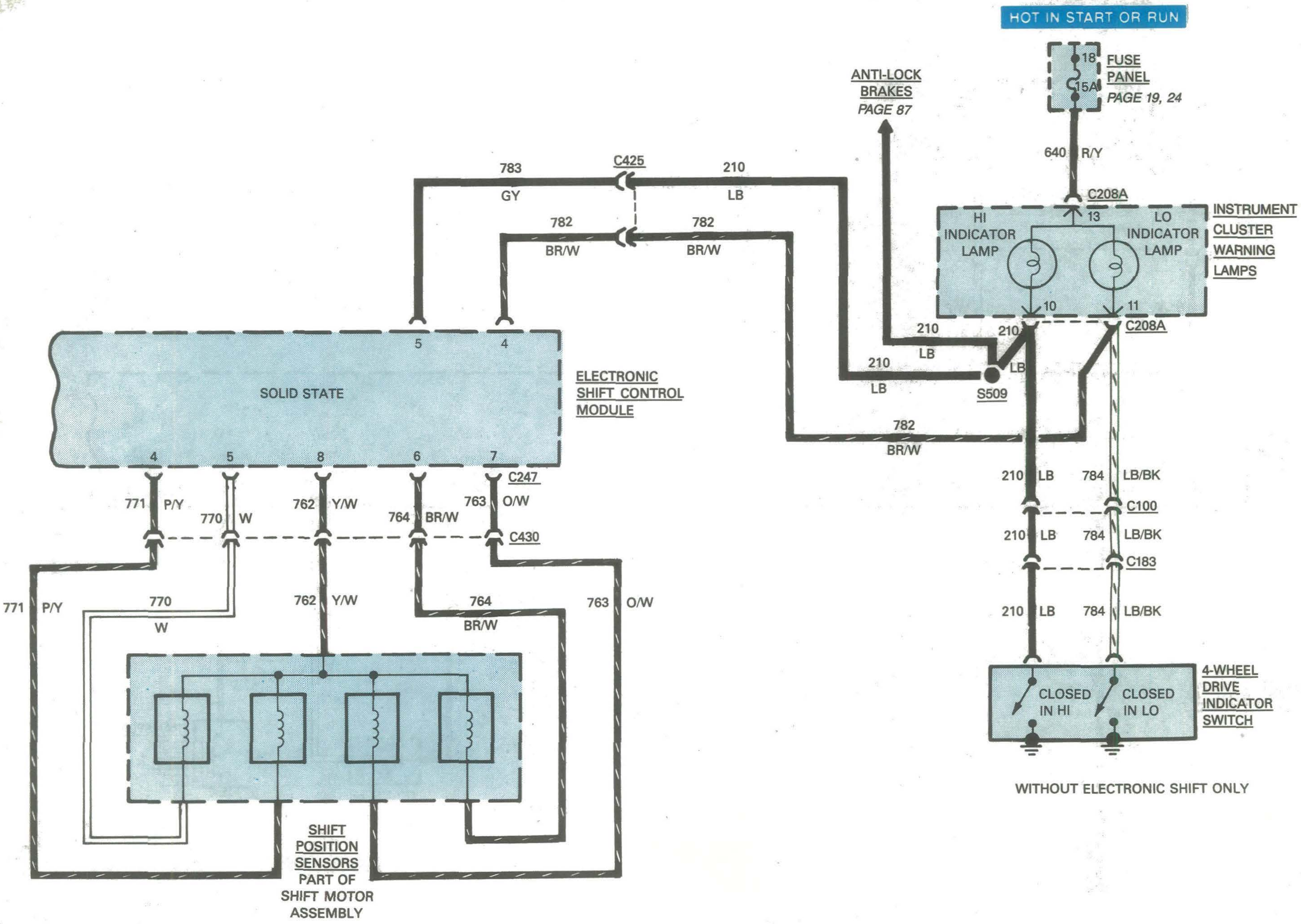
Anti-lock indicator on the module performs system diagnostics to detect defects or failures. When problems are detected the **Anti-lock Indicator** is lit. Problem diagnosis can be made by grounding the test connector terminal which will cause the **Anti-lock Indicator** to flash a diagnostic code. See Shop Manual Section for more information.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Anti-lock Brake Indicator	Part of instrument cluster			
Anti-lock Brake Module	Behind I/P left of center			
Anti-lock Rear Axle Sensor	At rear axle			
Electronic Rear Brake Proportioning Valve	Inside of LH frame rail behind #1 crossmember			
4×4 Indicator Switch	On transfer case	91-1		
Connector C100	LH thru dash			53
Connector C111	Behind I/P LH end (test)		BK	1
Connector C177	Engine compartment LH		GY	12
Connector C182	Engine compartment LH		GY/BL	6
Connector C183	Engine compartment LH		BR	2
Connector C208A	At instrument cluster			14
Connector C284	At 4×4 switch		BK	2
Connector C305	At LH side of steering column		GY	11
Connector C380				
Connector C386	Near RH battery			1
Ground G701	Behind I/P near center			
Ground G801	LH inner fender behind headlamp			
Splice S155	Near ERBP valve T/O			
Splice S404	Near clutch switch T/O			
Splice S509	Near anti-lock brake module T/O			
Splice S510	Near anti-lock brake module T/O			
Splice S511	Near anti-lock brake module T/O			


HOT AT ALL TIMES
HOT IN ACCY OR RUN
12
30A
FUSE PANEL
PAGE 19, 24
6
15A
FUSE PANEL
PAGE 19, 24
SPEED CONTROL
PAGE 130
296
W/P
517
BK/W
296
W/P
C425
517
BK/W
296
W/P
C427
4 X 4
LO
SHIFT CONTROL SWITCH
C431
780
DB
781
BR/W
465
W/BL
C425
C426
465
W/BL
780
DB
781
BR/W
C428
2
1
3
ELECTRONIC SHIFT CONTROL MODULE
SOLID STATE
3
2
1
2
3
2
3
1
C427
396
BK/O
G115
57
BK
C425
57
BK
S818
57
BK
S805
57
BK
S815
57
BK
G701
C429
463
R/W
463
R/W
C100
463
R/W
C182
463
R/W
C275
463
R/W
C276
AUTOMATIC TRANSMISSION SWITCH
CLOSED IN NEUTRAL
774
LG
C430
774
LG
TRANSFER CASE SPEED SENSOR
772
LB
772
LB
778
O
778
O
777
Y
777
Y
M
TRANSFER CASE MOTOR
779
BR
779
BR
TRANSFER CASE CLUTCH COIL

ELECTRONIC SHIFT — 4-WHEEL DRIVE/4-WHEEL DRIVE INDICATOR



4 WHEEL DRIVE INDICATOR

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN and the 4-wheel drive engaged, current flows through the **4-Wheel Drive Indicator**. The indicator bulb goes on.

TROUBLESHOOTING HINTS

INDICATOR DOES NOT GO ON

- Check **Fuse 6**.
- Check continuity of switch with 4-wheel drive engaged.

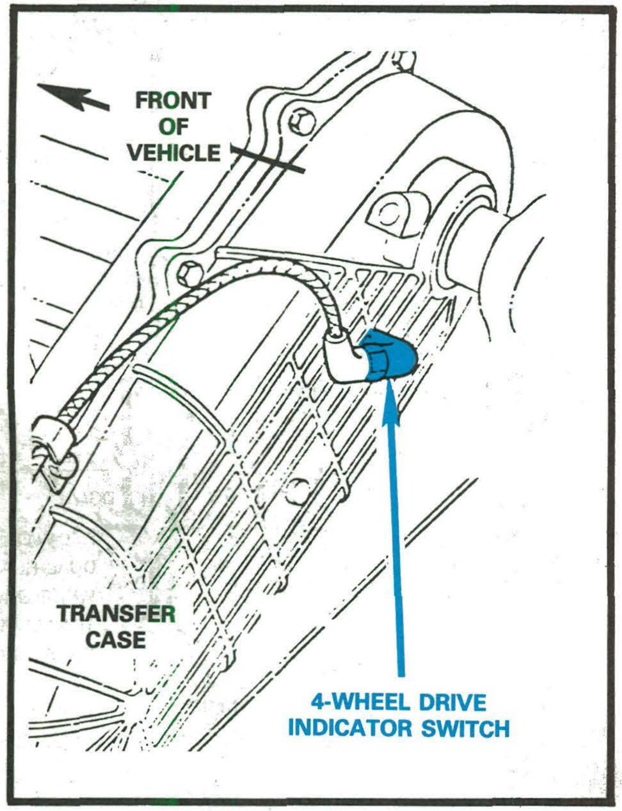


Figure 1 — At Transfer Case

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Automatic Transmission Switch	In automatic transmission			
Electronic Shift Control Module	RH cowl panel			
Shift Control Switch	On LH side of I/P			
Hi Indicator Lamp	Part of instrument cluster			
Lo Indicator Lamp	Part of instrument cluster			
Shift Position Sensors	Inside transfer case			
Transfer Case Clutch Coil	Inside transfer case			
Transfer Case Motor	Inside transfer case			
Transfer Case Speed Sensor	Inside transfer case			
4 Wheel Drive Indicator Switch	On transfer case			
Connector C100	LH thru dash			53
Connector C182	Engine compartment LH side		GY/BL	6
Connector C183	Engine compartment LH side		BR	2
Connector C208A	At instrument cluster			14
Connector C275	Engine compartment LH rear			8
Connector C276	At automatic transmission			5
Connector C425	RH cowl		BK	6
Connector C426	RH cowl		GY	2
Connector C427	At electronic shift control module		GY	8
Connector C428	At electronic shift control module		BR	5
Connector C429	At electronic shift control module			8
Connector C430	At transfer case			9
Ground G115	RH cowl near electronic shift control module			
Ground G701	Behind I/P near center			
Splice S509	Near anti-lock brake module T/O			
Splice S805	Near cigar lighter T/O			
Splice S814	Near W/S/W illumination lamp T/O			
Splice S815	Near G701 T/O			
Splice S818	Near RH courtesy lamp T/O			

ELECTRONIC SHIFT — 4 WHEEL DRIVE

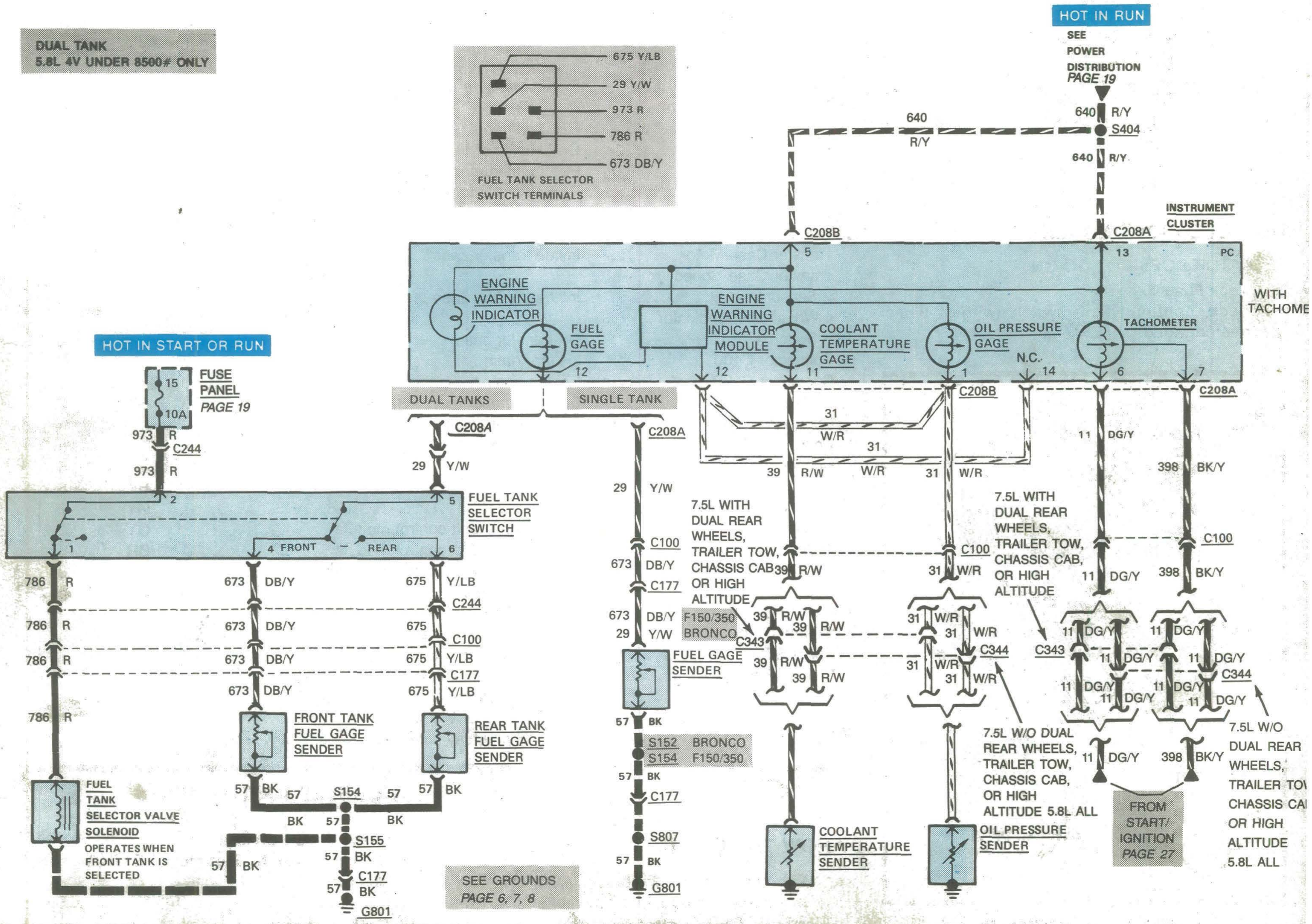
HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, power flows through **Circuit Breaker 12** to the **Electronic Shift Control Module**.

TROUBLESHOOTING HINTS

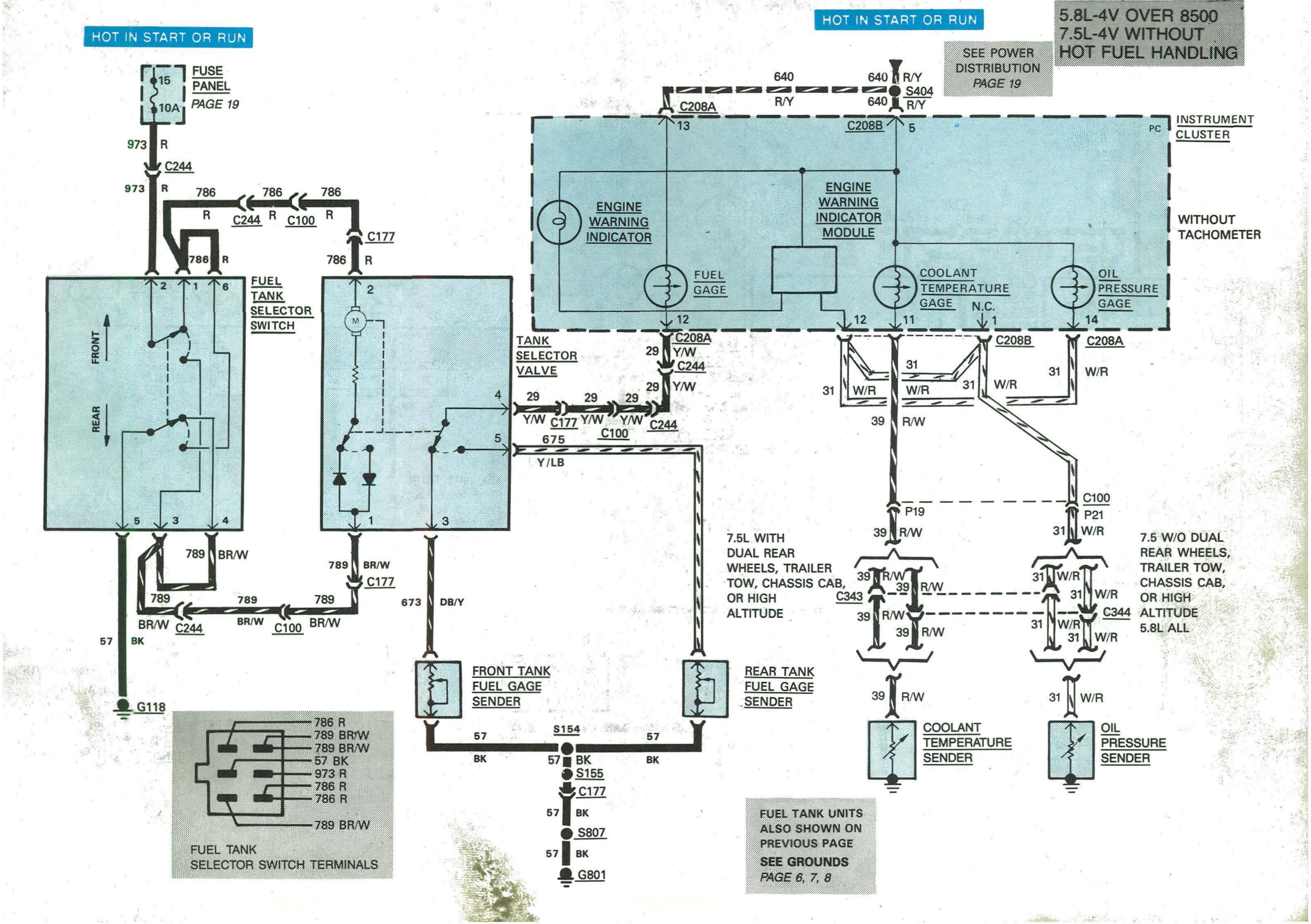
- Check Circuit Breaker 12
- Check power to **Electronic Shift Control Module**
- Check continuity through **Electronic Shift Control Module**.

FUEL TANK SELECTOR/GAGES (FUEL, COOLANT, OIL) (GASOLINE)



FUEL TANK SELECTOR/GAGES (FUEL, COOLANT, OIL) (DUAL TANKS) (GASOLINE)

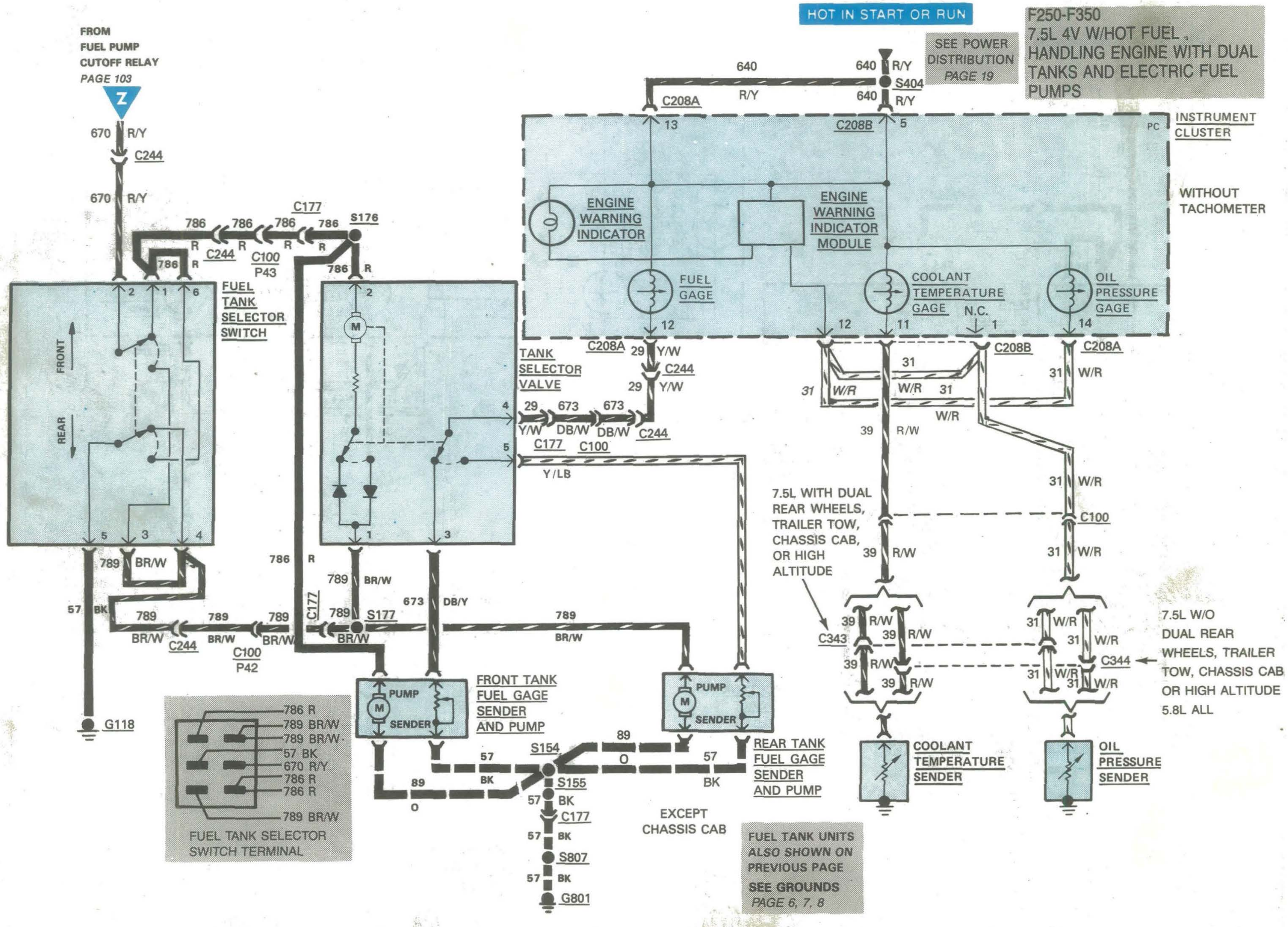
5.8L-4V OVER 8500
7.5L-4V WITHOUT
HOT FUEL HANDLING



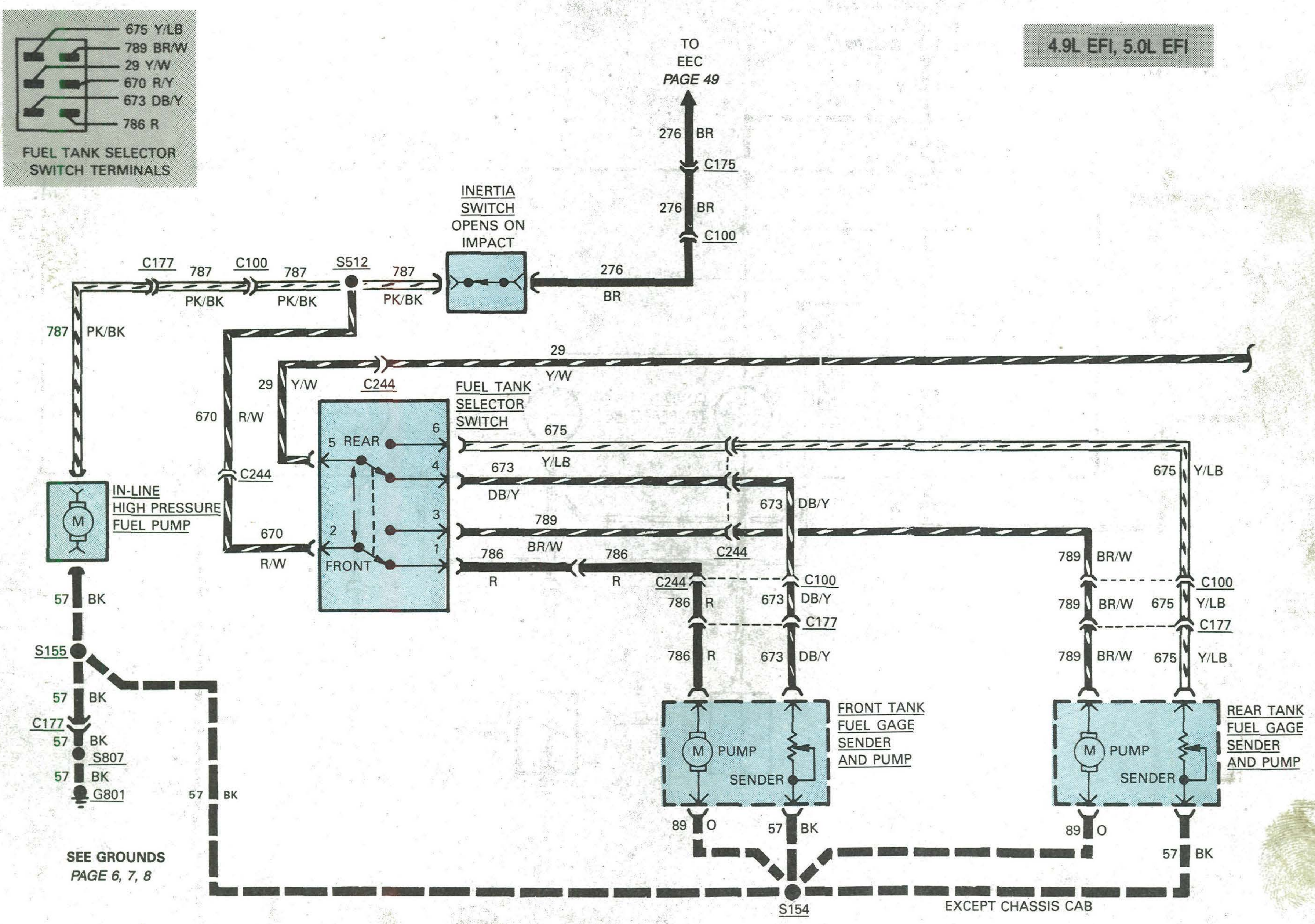
FUEL TANK UNITS ALSO SHOWN ON PREVIOUS PAGE

SEE GROUNDS
PAGE 6, 7, 8

FUEL TANK SELECTOR/GAGES (FUEL, COOLANT, OIL) (DUAL TANKS) (GASOLINE)

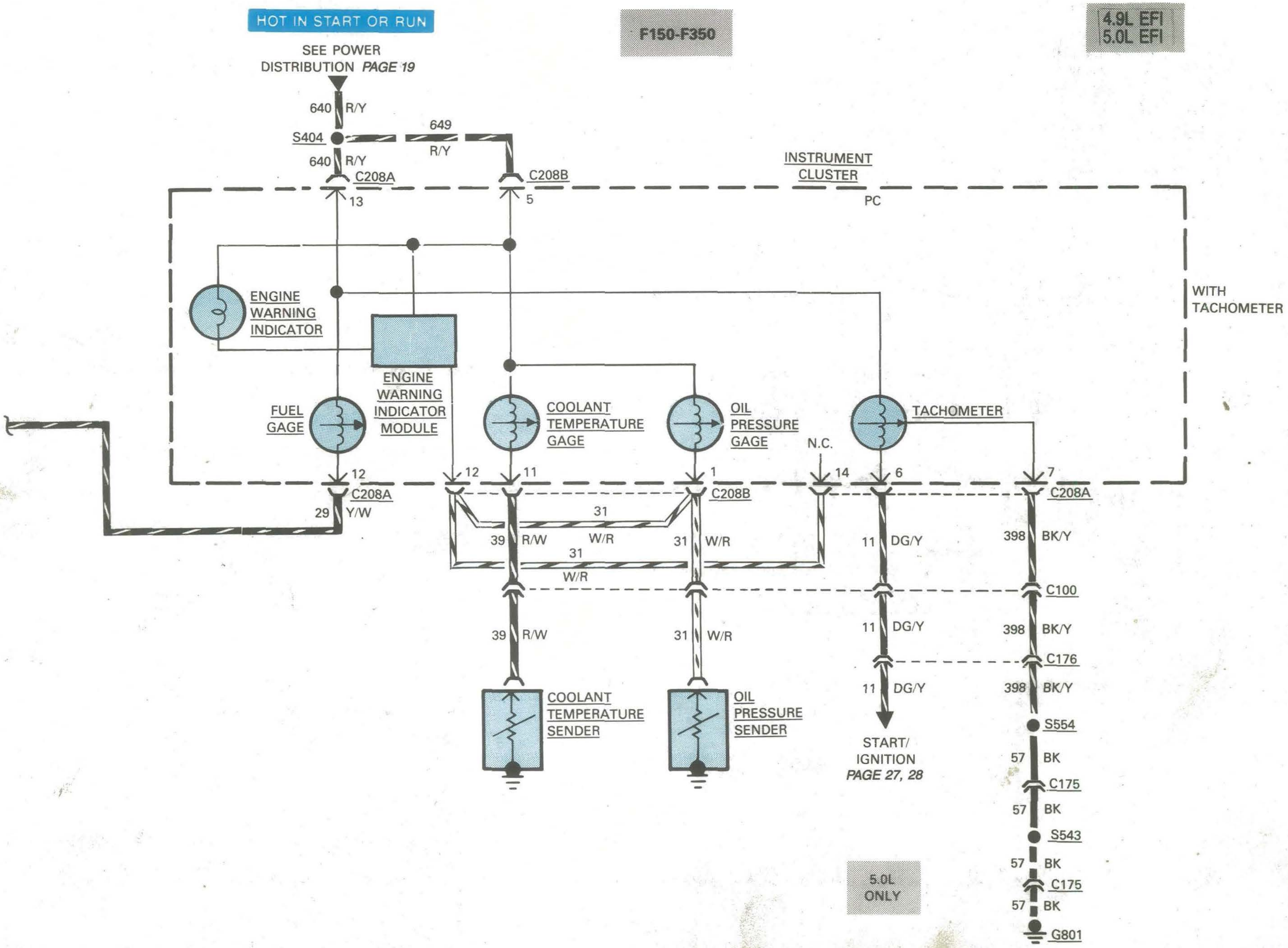


FUEL TANK SELECTOR/GAGES (FUEL, COOLANT OIL) (DUAL TANKS) (4.9L, 5.0L EFI)

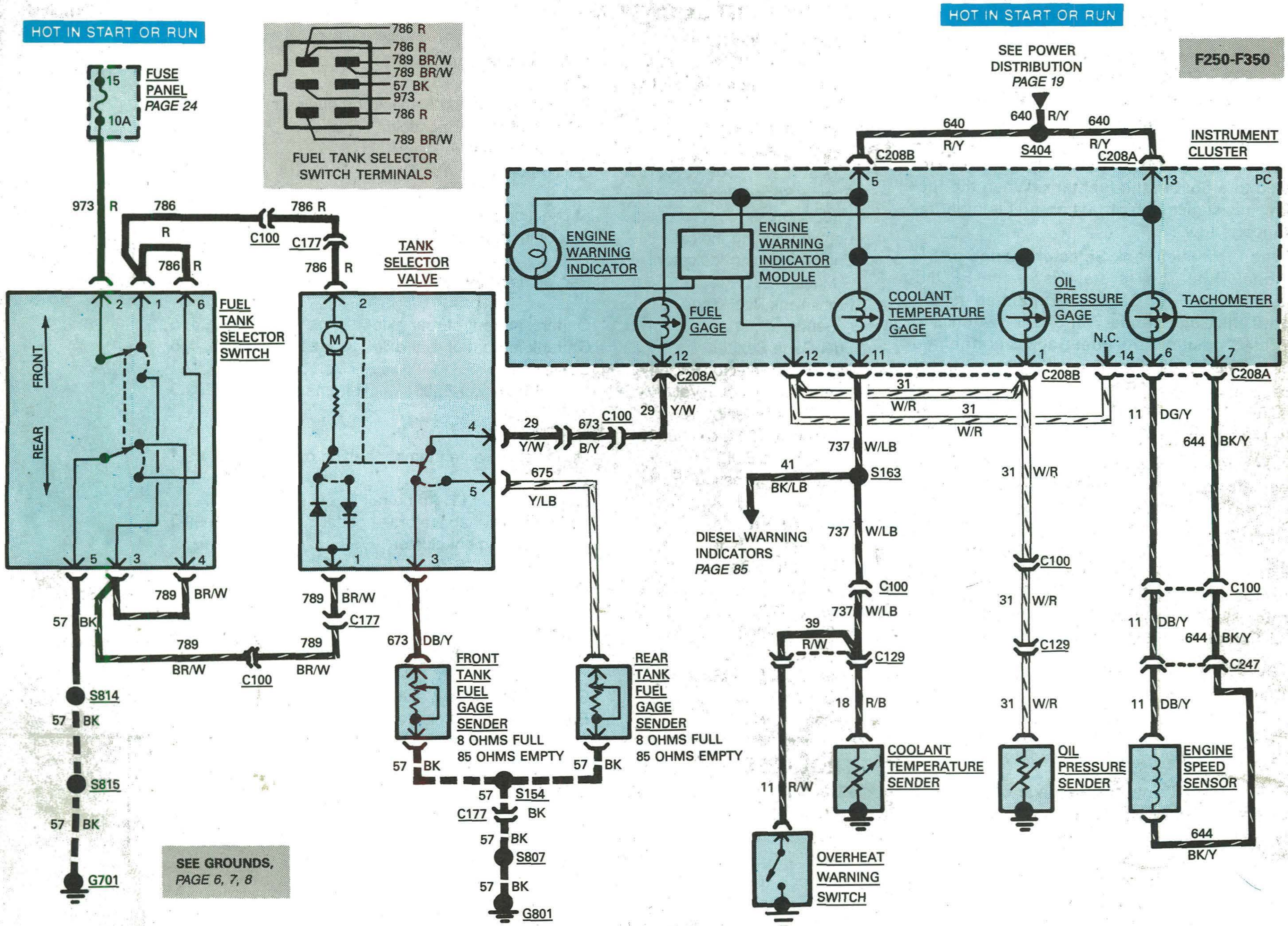


SEE GROUNDS
PAGE 6, 7, 8

FUEL TANK SELECTOR/GAGES (FUEL, COOLANT OIL) (DUAL TANKS)



FUEL TANK SELECTOR/GAGES FUEL, COOLANT, OIL TACH (DIESEL)



HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, circuit 640 R/Y from fuse 18 powers the **Fuel, Coolant Temperature, Oil Pressure Gages**, and **Tachometer** if so equipped.

The **Fuel Gage** connects to a **Fuel Gage Sender**. The **Sender** is a variable resistor connected to a float in the fuel tank. When the fuel is low, resistance is high; when fuel is high, resistance is low.

When the **Fuel Tank Selector Switch** in the optional Dual Tank system is in the FRONT position, the **Fuel Gage** is connected to the **Front Tank Gage Sender**. When the switch is in the REAR position, the **Fuel Gage** is connected to the **Rear Tank Fuel Gage Sender**. Current flows from **Fuse 15** through the switch to energize the motor driven **Tank Selector Valve** Fuel is now drawn from the rear tank.

The selector valves for the 6.9L and 7.5L engines are motor driven valves, used to switch the **Fuel Gage** between front and rear sending units as well as to switch fuel sources. The **Selector Switch** switches the sending units and activates a solenoid fuel valve to change fuel sources for the 5.8L engine. The **Selector Switch** switches the sending units and in tank **Fuel Pumps** for 4.9L and 5.0L engines.

The **Oil Pressure Gage** connects to the **Oil Pressure Sender**. The sender is a pressure-sensitive variable resistor. When the oil pressure is low, resistance is high; when the oil pressure is high, resistance is low.

The **Coolant Temperature Gage** connects to the **Coolant Temperature Sender**. The sender is a temperature-sensitive variable resistor. When the coolant temperature is low, resistance is high; when coolant temperature is high, resistance is low.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Coolant Temperature Gage	Part of instrument cluster			
Coolant Temperature Switch				
(4.9L)	Behind #6 exhaust manifold on engine block	140-1		
(5.0L and 5.8L)	LH side of intake manifold	35-2, 39-9		
(6.9L Diesel)	LH front of engine	44-1		
(7.5L)	LH side of intake manifold	37-4		
Engine Speed Sensor (6.9L Diesel)	At injection pump timing gear cover	44-1		
Engine Warning Indicator	Part of instrument cluster			
Engine Warning Indicator Module	Part of instrument cluster			
Front Tank Fuel Gage Sender	On tank in front of rear axle	100-3, 4, 5		
Fuel Gage Sender	On tank in front of rear axle	100-3, 4, 5		
Fuel Tank Selector Switch	Center of I/P			
Fuel Tank Selector Valve	— (5.8L under 8500) — LH frame rail	99-3		
Fuel Tank Selector Valve Solenoid (5.8L over 8500 7.5 and 6.9L)	On LH side frame member behind cab	99-1		
In-line High Pressure Fuel Pump	Inboard side of LH frame rail			
Inertia Switch	LH dash panel above brake pedal	99-1		
Oil Pressure Gage	Part of instrument cluster			
Oil Pressure Sender				
(4.9L)	On engine block to rear of oil filter	140-1		
(5.0L, 5.8L)	LH front of engine	35-2, 39-9		
(6.9L Diesel)	Rear of engine	44-2		
(7.5L)	Center rear of engine	37-4		
Rear Tank Fuel Gage Sender	On tank behind rear axle	100-3, 4, 5		
Tachometer	Part of instrument cluster			

TROUBLESHOOTING HINTS

FUEL TANK SELECTOR SOLENOID DOES NOT WORK

- Check power at solenoid with switch in FRONT position.
- Check fuel flow by pinching tank fuel lines and cranking engine.
- See Shop Manual for detailed troubleshooting.

ONE GAGE DOESN'T WORK

- Check sender ground connection.
- Disconnect wires from sender. Check for broken or corroded terminals.
- Connect test light or gage tester between gage wire and ground. Turn **Ignition Switch** to RUN or ACCY.
- If light won't light, check for open circuit in gage or wiring. Normal gage resistance is 10 to 14 ohms.

ANY GAGE OUT OF CALIBRATION

- Disconnect wires from sender. Check for broken or corroded terminals.
- Test with Gauge System Tester No. 021-00038.
- If Tester is unavailable, check gage calibration with 210 ohm (high) and 10 ohm (low) resistors. If gage tests within calibration, replace sender. If gage tests out of calibration, replace gage.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Connector C100	LH thru dash			53
Connector C129	RH fender apron	43-1	GY	8
Connector C175	Engine compartment LH side			10
Connector C176	Engine compartment LH side			8
Connector C177	Engine compartment LH side		GY	12
Connector C208A	At instrument cluster			14
Connector C208B	At instrument cluster			14
Connector C244	Behind center of I/P		BK	8
Connector C247	Engine compartment RH side			4
Connector C343	LH fender apron near ignition module		BK	8
Connector C344	LH fender apron near ignition module		BK	8
Ground G701	Behind I/P near center			
Ground G801	LH inner fender behind headlamp			
Splice S152	Near LH backup lamp T/O			
Splice S154	Near front fuel gage sender T/O			
Splice S155	Near ERBP valve T/O			
Splice S176	Near fuel tank selector valve T/O			
Splice S177	Near fuel tank selector valve T/O			
Splice S404	Near clutch switch T/O			
Splice S512	Near fuel tank selector T/O			
Splice S543	Near brake sensor T/O			
Splice S554	Near speed sensor T/O			
Splice S807	Near LH headlamp T/O			
Splice S814	Near WSW illumination lamp T/O			
Splice S815	Near G701 T/O			

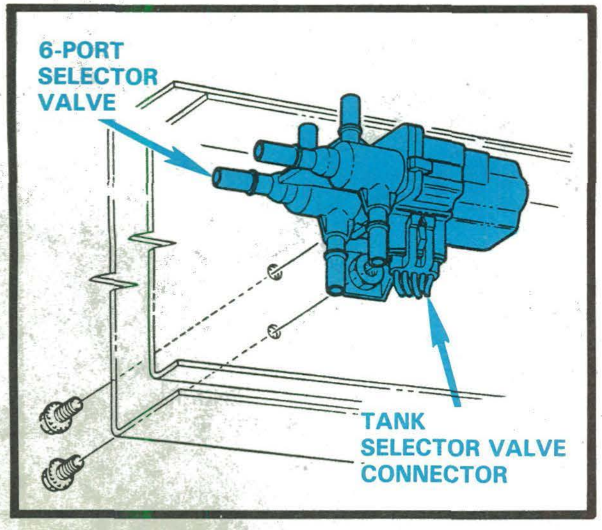


Figure 1 — 6 Port Fuel Tank Selector Valve, LH Side of Mainframe, Aft of Cab — 5.8L over 8500, 7.5L and

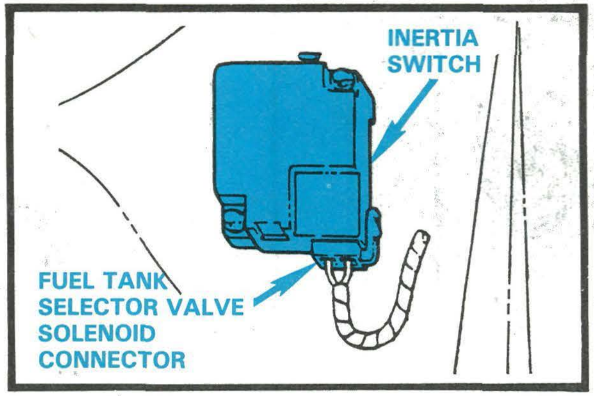


Figure 2 — RH Side Below Heater Duct 7.5L W/Electric Fuel Pump

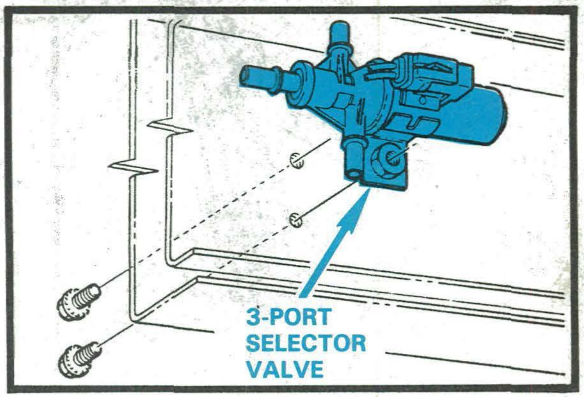


Figure 3 — LH Side of Mainmember Aft of Cab 3-Port Fuel Selector Valve — 5.8L

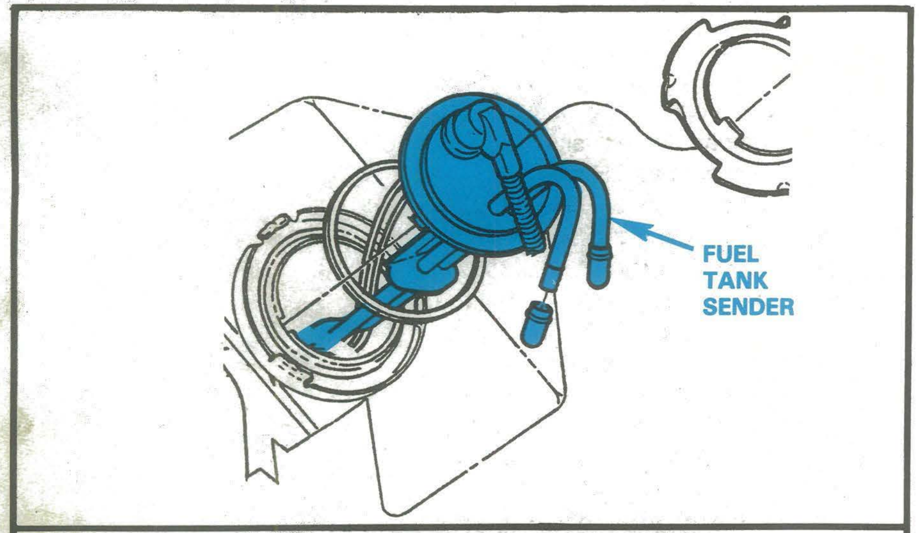


Figure 4 — Rear Tank (Behind Rear Axle)
(Bronco Only)

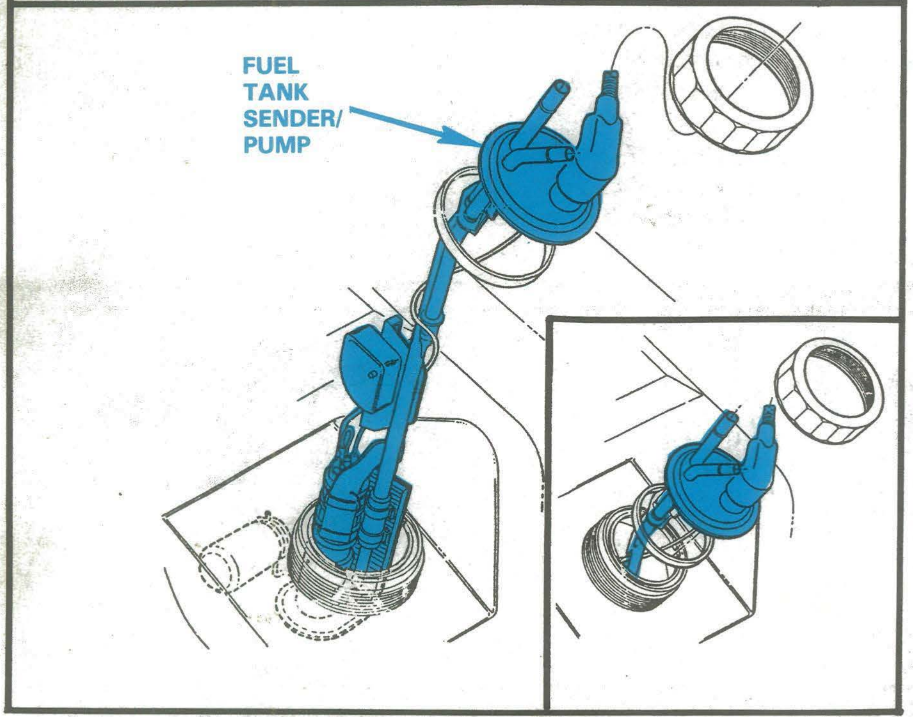


Figure 5 — Plastic Fuel Tank
(F-Series)

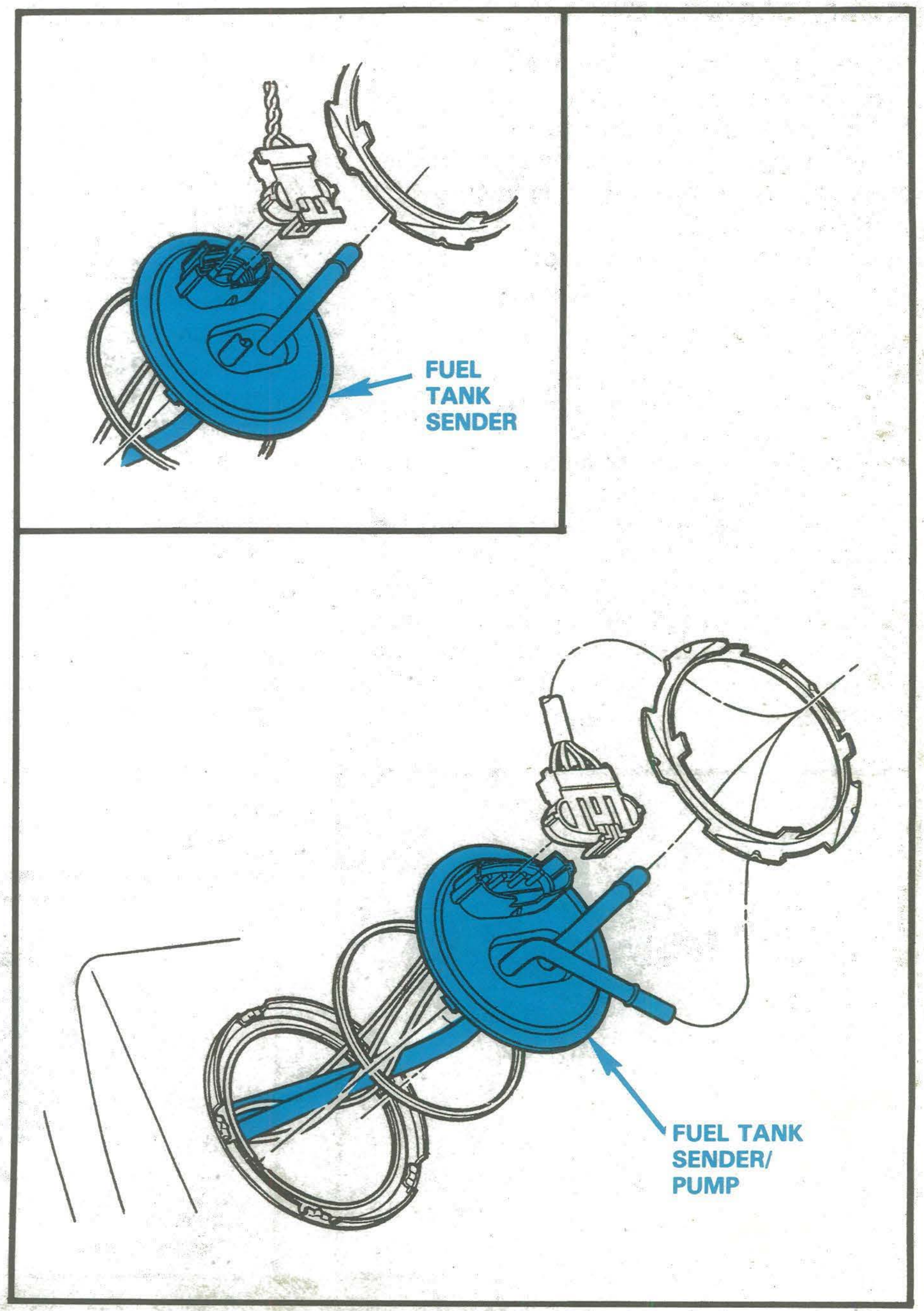
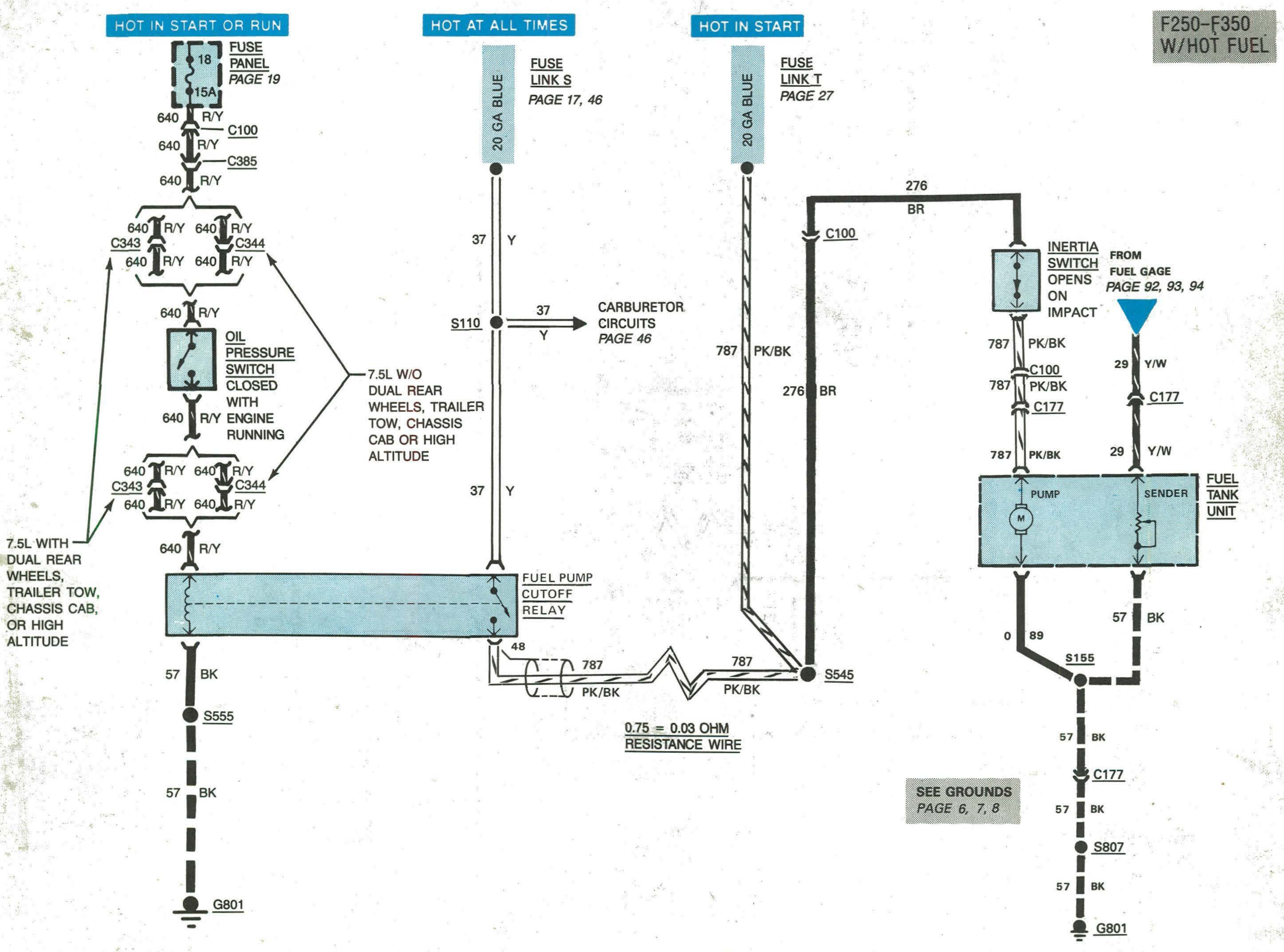
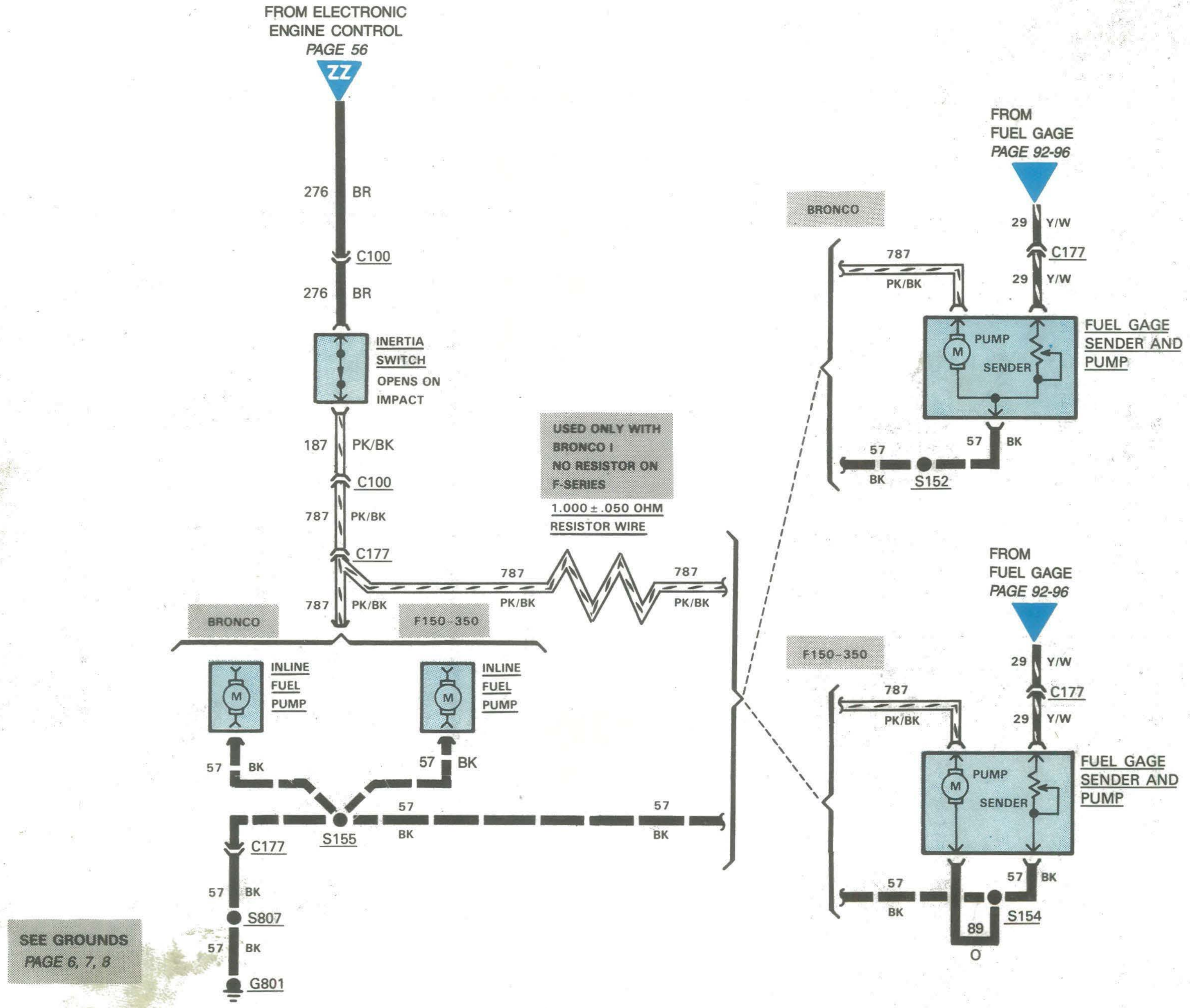


Figure 6 — Metal Fuel Tank
(F-Series)

ELECTRIC FUEL PUMP CONTROL (SINGLE TANK) (7.5L ENGINE)

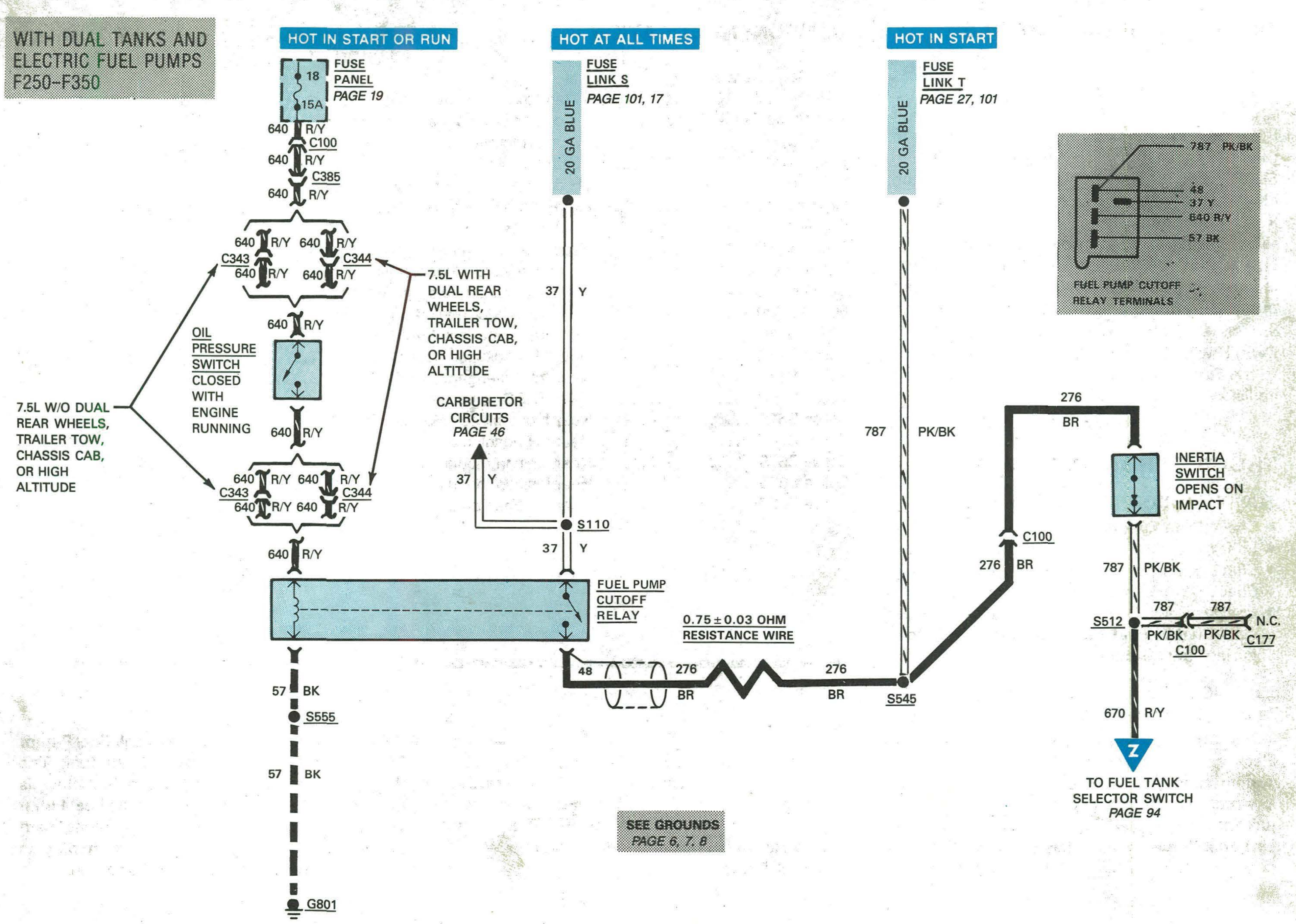


102 ELECTRIC FUEL PUMP CONTROL (SINGLE TANK) (4.9L AND 5.0L EFI ENGINE)



ELECTRIC FUEL PUMP CONTROL (DUAL TANKS) (7.5L ENGINE)

WITH DUAL TANKS AND
ELECTRIC FUEL PUMPS
F250–F350



HOW THE CIRCUIT WORKS

ELECTRIC FUEL PUMP CONTROL (SINGLE TANK) — 7.5L ENGINE

With the **Ignition Switch** in START current flows from **Fuse Link T** and powers the pump in the **Fuel Tank Unit**. With the **Ignition Switch** in START or RUN and the **Oil Pressure Switch** closed (engine running), the **Fuel Pump Cutoff Relay** coil is energized. The contacts in the relay close and the pump is powered by **Fuse Link S**. With the Ignition Switch in RUN, power is removed from **Fuse Link T**. The voltage at the pump is reduced slightly by the voltage drop across **0.75 ohm Resistance Wire.** The **Inertia Switch** will open on impact and cut off power to the **Fuel Pump Cutoff Relay** in the event of a collision.

TROUBLESHOOTING HINTS

FUEL PUMP DOESN'T OPERATE

- Check **Fuse Link S.**
- Check that **G801** is clean and tight.
- Check operation of **Fuel Pump Cutoff Relay.**
- Check continuity through **Inertia Switch.**
- Check oil level to ensure that the **Oil Pressure Switch Fuel Pump** contacts will close during engine operation.

ELECTRIC FUEL PUMP CONTROL (SINGLE TANK) 4.9L AND 5.0L EFI ENGINES

The 4.9L and 5.0L EFI engines use EEC IV Electronic Fuel Injection (EFI). The fuel delivery system consists of two electric fuel pumps. A low pressure **In-Tank Fuel Pump** which pumps fuel into a reservoir, and a high pressure **In-Line Fuel Pump**, which takes fuel from the **Reservoir** and pumps fuel to the **Fuel Injectors.**

With the **Ignition Switch** in Start or Run, current is supplied to the **Fuel Pump Relay** through **Fuse Link M.** When the **Fuel Pump Relay** receives a signal from the **ECA** and with the **Inertia Switch** closed, power is supplied to the **Fuel Pumps.**

Current is supplied to the **In-Tank Fuel Pump.** This pump fills the **Reservoir** with fuel. The **Reservoir** assures that adequate fuel flow is available to the high pressure **In-Line Fuel Pump** when climbing steep grades and during hard cornering, when the **In-Tank Fuel Pump** may be starved of fuel during low fuel conditions.

COMPONENT LOCATION

COMPONENT LOCATION		Page-Figure	Color	Terminals
Fuel/Gage Sender and Pump	At tank in front of rear axle	100-3, 4, 5		
Fuel Pump Cutoff Relay	LH corner of dash panel in engine compartment			
Fuse Link S, T	At starter relay			
Inertia Switch	LH dash panel above brake pedal	99-2		
Oil Pressure Switch	LH rear top of engine 7.5L	37-4		
Connector C100	LH thru dash			53
Connector C177	Engine compartment LH side		GY	12
Connector C343	LH fender apron, near ignition module		BK	8
Connector C344	LH fender apron near ignition module		BK	8
Ground G802	LH inner fender behind headlamp			
Splice S110	Near fuel pump cutoff relay T/O			
Splice S152	Near LH backup lamp T/O			
Splice S154	Near front fuel gage sender T/O			
Splice S155	Near ERBP valve			
Splice S512	Near fuel tank selector switch T/O			
Splice S545	Near LH headlamp T/O			
Splice S555	Near ignition module T/O			
Splice S556	Near ignition module T/O			
Splice S807	Near LH headlamp T/O			

ELECTRIC FUEL PUMP CONTROL (DUAL TANKS) 4.9L AND 5.0L EFI ENGINES

The **Electric Fuel Pump Control** for 4.9L and 5.0L EFI engines consist of three electric fuel pumps. Two low pressure (CF68 In-Tank Fuel Pumps, located in both the front and rear tanks, pump fuel into a reservoir. A high pressure **In-Line Fuel Pump** then takes the fuel from the **Reservoir** to the **Fuel Injectors.**

This system allows fuel to be drawn from either the **Front** or **Rear Fuel Tank Unit.** With the **Ignition Switch** in Start or Run, current flows through **Fuse Link M** to the **Fuel Pump Relay.** When the **Fuel Pump Relay** receives a signal from the **ECA,** and with the **Inertia Switch** closed, power is supplied to the **In-Line Fuel Pump,** and depending on which position the **Fuel Tank Selector Switch** is in (FRONT or REAR), to either the **Front** or **Rear In-Tank Fuel Pump.**

THE **Fuel Tank Selector Switch** controls which **Fuel Tank Unit** is used. When turned to the FRONT position, power flows through the Front contacts of the **Fuel Tank Selector Switch,** and to the fuel pump in the **Front Fuel Tanks.** The sender in the **Front Fuel Tank Unit** is connected simultaneously to the **Fuel Gage.**

When the **Fuel Tank Selector Switch** is turned back to REAR, the fuel pump in the **Rear Fuel Tank Unit** is connected simultaneously to the **Fuel Gage.**

For circuit description and troubleshooting hints of gages, please see pages 98 and 99.

TROUBLESHOOTING HINTS

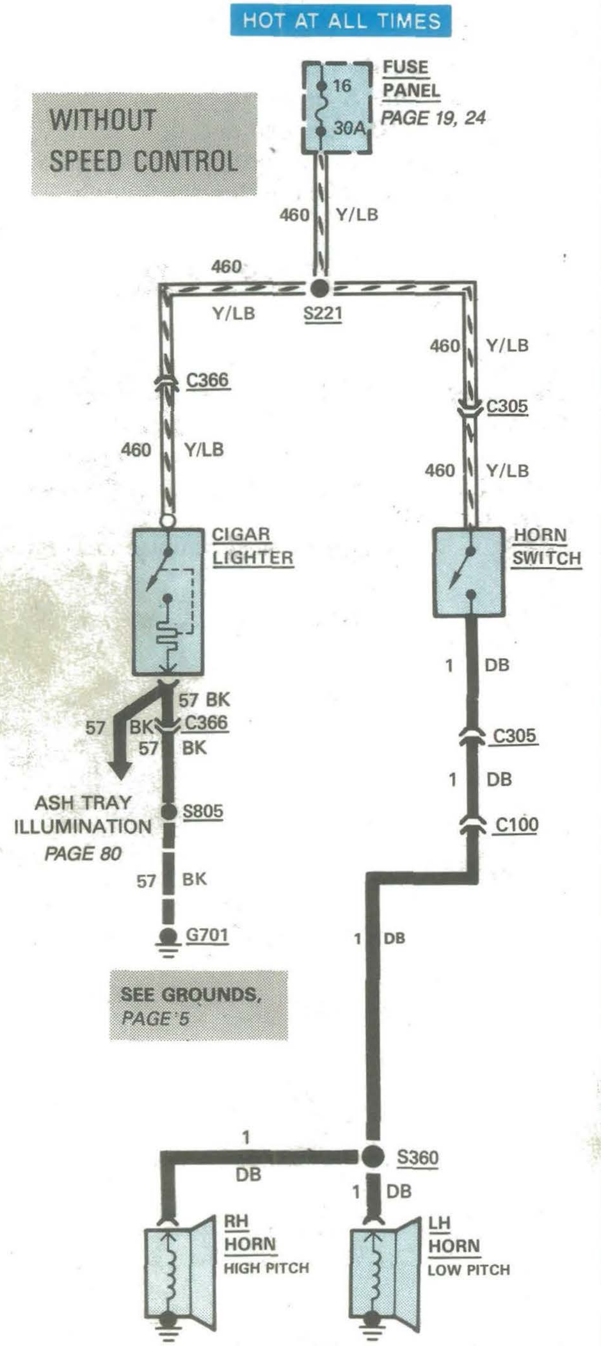
FUEL PUMP DOESN'T OPERATE

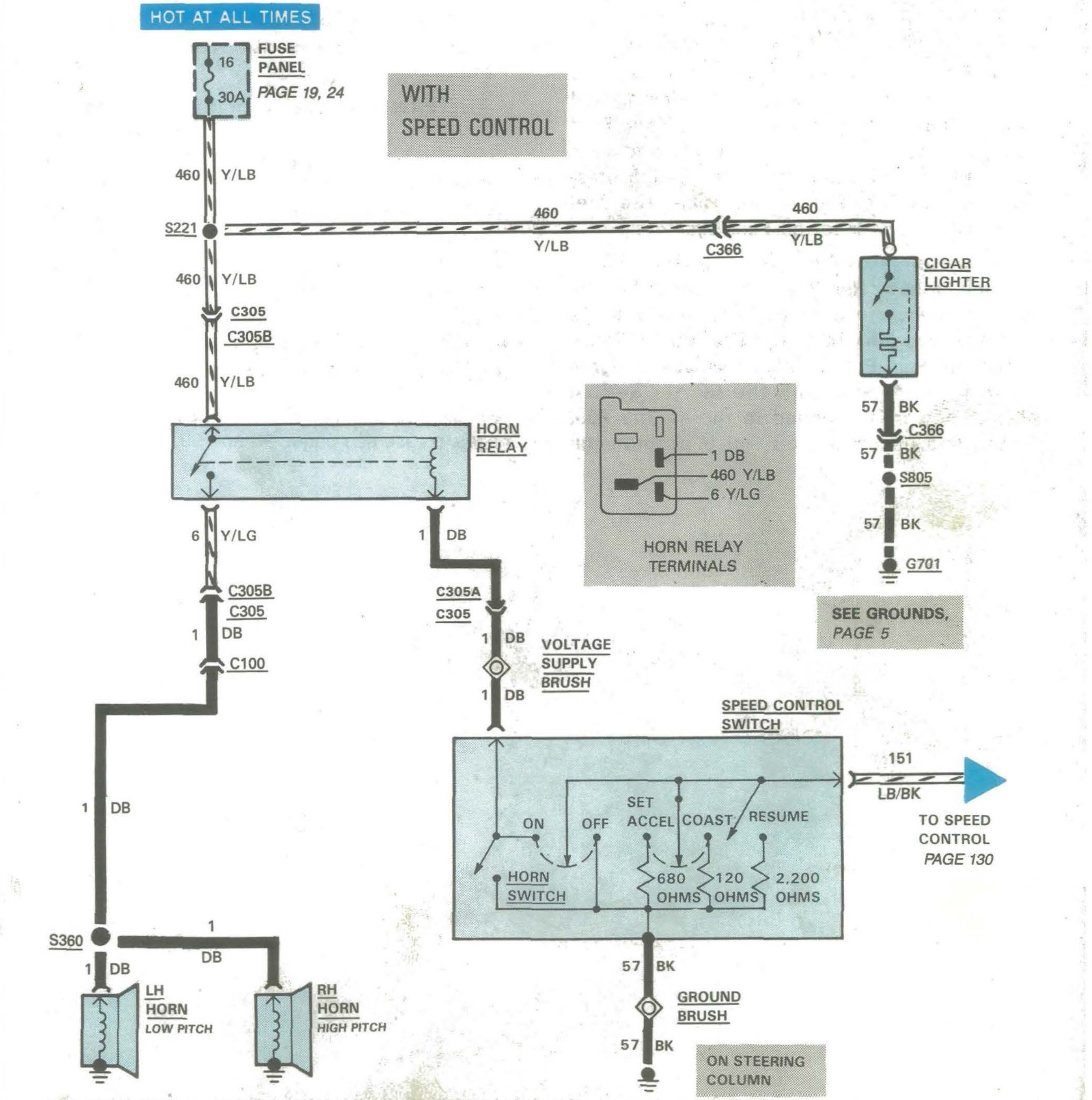
- Check **Fuse Link S or M.**
- Check that **G701** is clean and tight.
- Check operation of **Fuel Pump Cutoff Relay.**
- Check continuity through **Inertia Switch.**

FUEL TANK UNITS DON'T SWITCH (DUAL TANKS)

- Check **Fuse Link S or M.**
- Check that **G701** is clean and tight.
- Disconnect connector at **Tank Selector Switch.** With the **Ignition Switch** in RUN, turn **Fuel Tank Selector Switch** to FRONT. Check for 12 volts at terminal #1 of the harness connector.
- See Shop Manual for detailed troubleshooting.

HORN/CIGAR LIGHTER





HORN

HOW THE CIRCUIT WORKS

Horns (Without Speed Control)

When the **Horn Switch** is closed, current flows through **Fuse 16** to the **Horns**.

Horns (With Speed Control)

Pressing the **Horn Switch** energizes the **Horn Relay.** The **Relay** closes, and current flows through **Fuse 16** to the **Horns.**

TROUBLESHOOTING HINTS

HORN DOES NOT SOUND

- Check voltage at **Horn Connector** with **Horn Switch** depressed.
- Turn adjusting screw on **Horn** counterclockwise ¼ to ⅜ turn, then secure. Press **Horn Switch.** If **Horn** does not sound, remove and replace horn.

CIGAR LIGHTER

HOW THE CIRCUIT WORKS

Voltage is applied at all times to the **Cigar Lighter.** Pushing in the **Cigar Lighter** closes the switch and allows current to flow through the heating element. The element opens the switch when it is heated.

TROUBLESHOOTING HINTS

- Check **Fuse 16.**
- Check continuity to ground at lighter shell.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Cigar Lighter	Center of I/P			
Horns	LH front of radiator support	107-1		
Horn Relay	On speed control amplifier	107-2		
Horn Switch	In steering wheel hub assembly			53
Connector C100	LH thru dash			53
Connector C305	LH side of steering column		GY	11
Connector C305A	LH side of steering column		GY	11
Connector C305B	LH side of steering column		GY	11
Connector C366	Behind center of I/P		GY	3
Ground G701	Behind I/P, near center			
Splice S360	Near LH horn			
Splice S221	Near ignition switch T/O			
Splice S805	Near cigar lighter T/O			

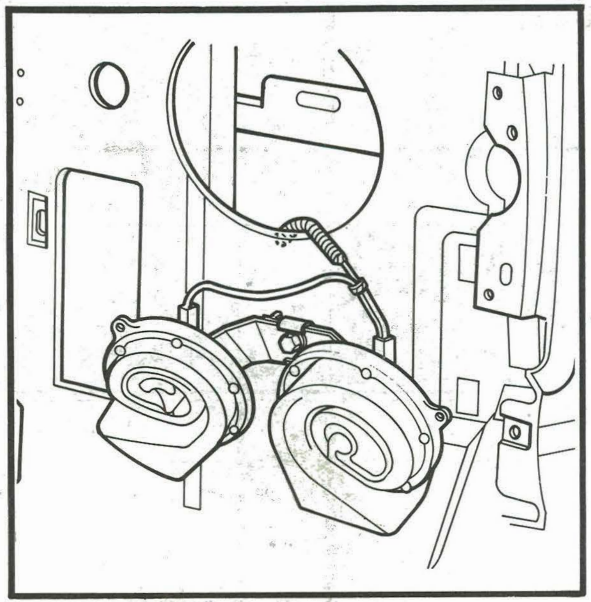


Figure 1 - Forward of Radiator Support, Single Bracket Mounting Dual Horns

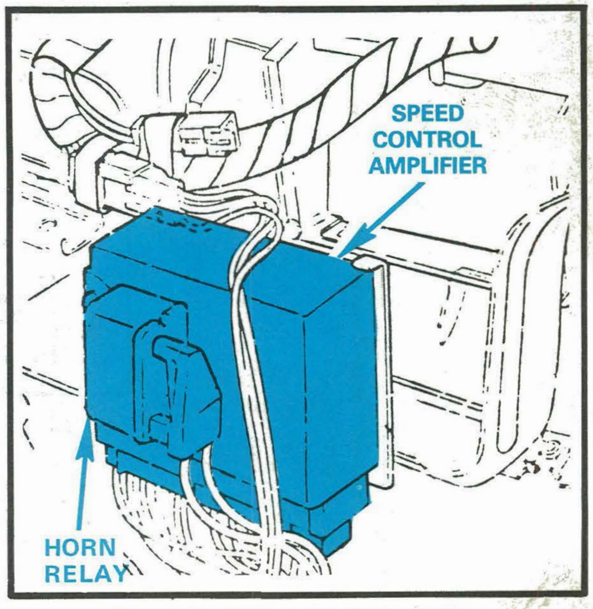
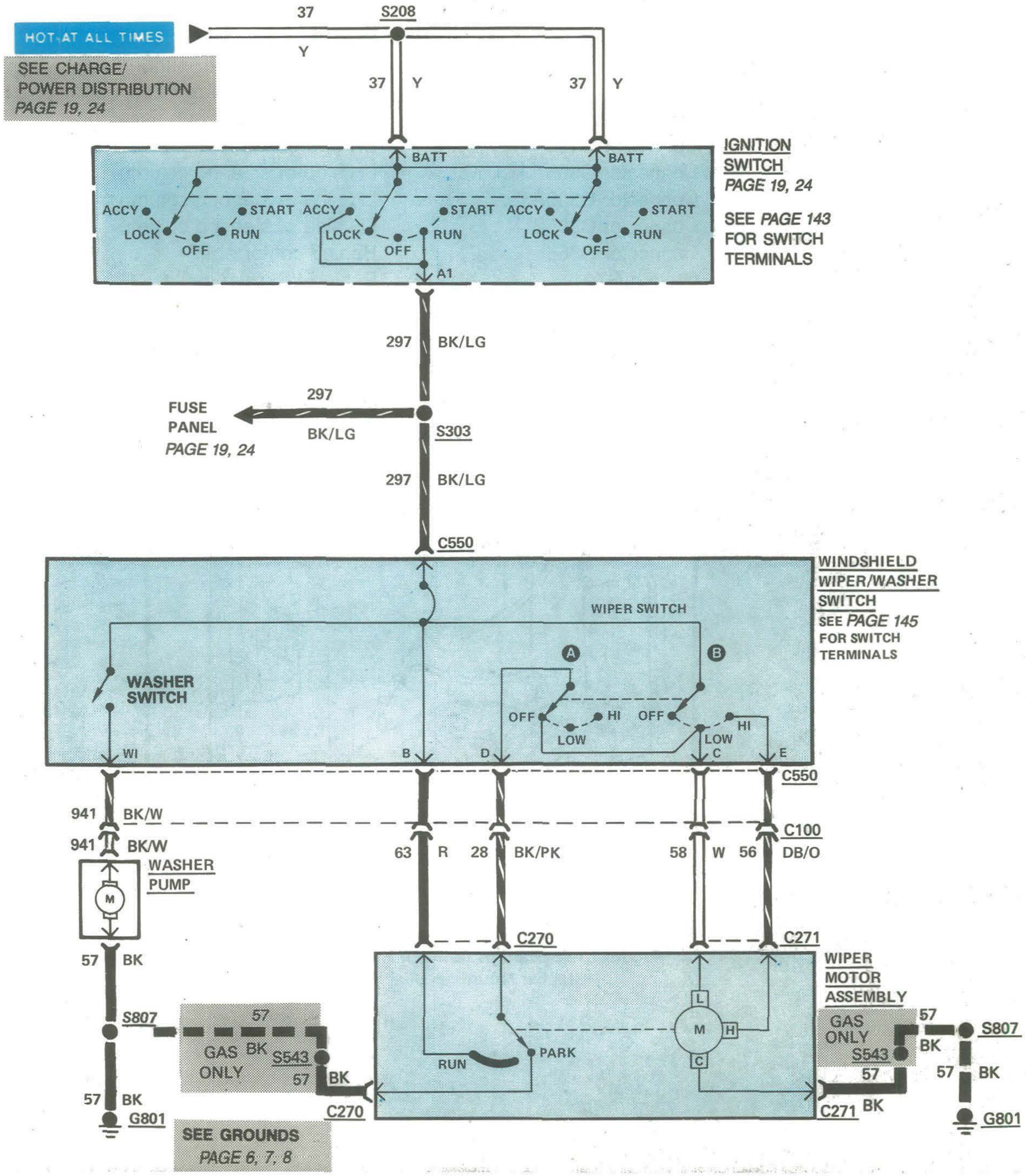


Figure 2 - Behind LH Side of I/P

WINDSHIELD WIPER/WASHER



HOW THE CIRCUIT WORKS

The **Windshield Wiper/Washer Switch** has both a momentary washer switch and wiper switch. The wiper switch has three positions: OFF, and LO and HI speeds.

Washer Operation—Current flows directly to the **Washer Pump** motor as long as the washer switch is depressed.

Wiper Operation—The wipers are controlled by the three-position wiper switch and the wiper motor switch. When the wipers are turned OFF, they continue to operate until they return to the PARK position of the wiper motor switch.

In LO or HI current flows through the wiper switch, into the H or L terminal of the **Wiper Motor,** and grounds through the C terminal.

When parking current flows through:

1. the **R** wire to the RUN contact of the wiper motor switch;
2. through the wiper motor switch and the **BK/PK** wire to the wiper switch;
3. through section Ⓐ of the wiper switch and the **W** wire to the **Wiper Motor** L terminal;
4. through **Wiper Motor** C terminal to ground.
5. When the **Wiper Motor** reaches the end of its travel, the wiper motor switch moves to PARK position. In this position, power is removed from the motor, and operation stops.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Ignition Switch	Attached to steering column			
Washer Pump	In washer reservoir			
Windshield Wiper/Washer Switch	On LH side of I/P	112-2		
Wiper Motor Assembly	Attached to center of dash panel			
Connector C100	LH thru dash			53
Connector C270	At wiper motor			3
Connector C271	At wiper motor			3
Connector C550	At windshield wiper/washer switch	112-1	BK	10
Ground G801	LH inner fender behind headlamp			
Splice S208	Near main light switch T/O			
Splice S303	Near main light switch T/O			
Splice S543	Near brake sensor T/O			
Splice S807	Near LH headlamp T/O			

TROUBLESHOOTING HINTS

WASHER PUMP DOESN'T WORK

- Check for low fluid level and for damaged hoses. Check circuit breaker.
- Disconnect plug at bottom of washer reservoir. Check for voltage on **BK/W** wire, and for ground on **BK** wire with washer switch closed. Replace pump motor, seal, and impeller assembly if bad.

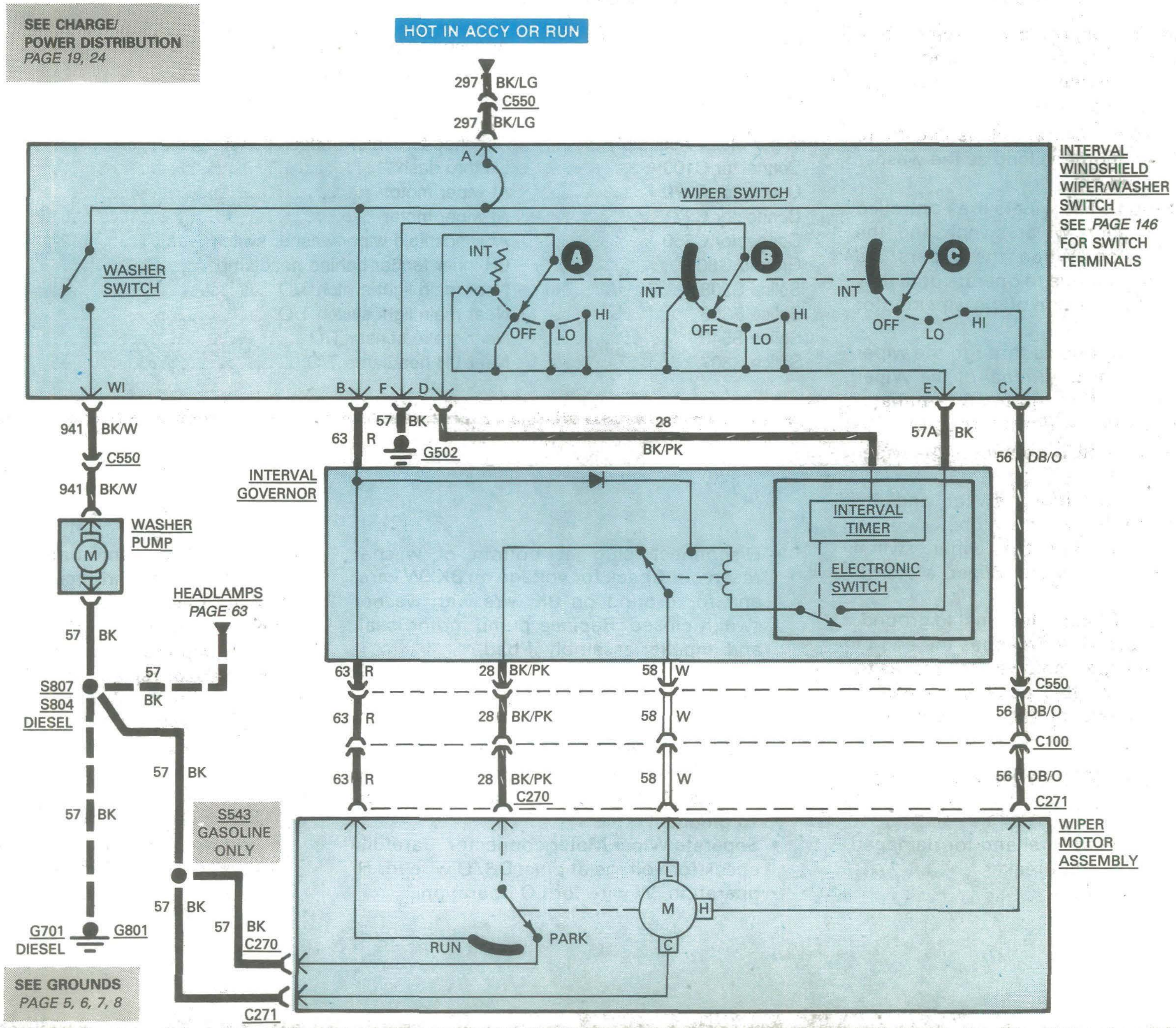
WIPERS DON'T WORK

- Operate washer to check circuit breaker in the wiper/washer switch. If faulty, perform ''Circuit Breaker Test'' in Shop Manual Section 35-60. If still bad, check for short circuit to ground.
- Separate **Wiper Motor** connector. Carefully check for voltage at pins: **DB/O** wire for HI operation, **W** wire for LO operation.
- If voltage is present at pins (above), ground **Wiper Motor** ground circuit with a wire jumper. If motor runs, repair ground. If motor doesn't run, perform "Wiper Motor Current Draw Test — Non-Depressed Park" in Shop Manual Section 35-60, or replace motor.
- If no voltage at pins (above), perform "Wiper Switch Continuity Test" in Shop Manual Section 35-60.

WIPERS RUN BUT DON'T PARK

- Perform "Parking Test — Non-Depressed Park" in Shop Manual Section 35-60.

INTERVAL WIPER/WASHER



HOW THE CIRCUIT WORKS

The **Interval Windshield Wiper/Washer** allows the driver to select LO speed, HI speed, or INTerval wipe. In INTerval, the wipes can be spaced one second to fifteen seconds apart.

The **Interval Windshield Wiper/Washer Switch** has a momentary washer switch, a four-position wiper switch, and a variable resistor which sets interval time.

Washer Operation

As long as the washer switch is pressed, current flows directly to the **Washer Pump** motor.

Wiper Operation

When the wiper switch is in the LO position, section Ⓐ of the wiper switch powers the interval timer input so that the electronic switch is pulled closed. Current then flows through the wiper/washer switch, wire **63R**, the diode, the governor relay coil, wire **58W**, and section Ⓑ of the wiper/washer switch to **G502**. The governor relay coil pulls in the governor switch allowing current to flow through the motor.

When the wiper switch is in the **HI** position, section Ⓒ of the wiper/washer switch powers the motor through the H terminal.

When the wiper switch is placed in the OFF position, the circuit energizing the **Interval Governor** relay coil is broken. Current to the motor then flows through circuit **63**, the RUN contact of the wiper motor switch, and the de-energized **Interval Governor** relay contacts to the L terminal of the motor. After the completion of one wipe, the wiper motor switch returns to the PARK position. This removes power and the wiper motor stops.

COMPONENT LOCATION

COMPONENT LOCATION		Page-Figure	Color	Terminals
Interval Governor	Lower reinforcement of I/P to left side of cowl	112-1		
Interval Windshield Wiper/Washer Switch	On LH side of I/P	112-1		
Washer Pump	In washer reservoir			
Wiper Motor Assembly	Attached to center of dash panel			
Connector C100	LH side of dash panel			53
Connector C270	At wiper motor			3
Connector C271	At wiper motor			3
Connector C550	Behind LH side of I/P near interval governor		BK	7
Ground G502	Behind LH side of I/P	112-1		3
Ground G801	LH inner fender behind headlamp	66-2		
Splice S208	Near main light switch T/O			
Splice S303	Near main light switch T/O			
Splice S543	Near brake sensor T/O			
Splice S807	Near LF headlamp T/O			

Interval Wiper Operation

During interval operation, the wipers make single wipes at low speed separated by a variable length pause.

When first switched to INT position, section Ⓐ of the wiper switch activates the interval timer. The interval timer momentarily closes the electronic switch, energizing the governor relay. Current flows to the wiper motor L terminal through the energized contacts of the governor relay. Ground is connected to terminal C of the wiper motor.

As the wiper motor turns, the wiper motor switch changes from the grounded PARK position to the hot RUN position. Current now flows through the **R** wire, the RUN contact of the wiper motor switch and resets the interval timer, which opens the electronic switch. The current path continues through the de-energized governor relay contact to the L terminal of the wiper motor. Wiping continues to the completion of one wipe. The wiper motor switch returns to the PARK position contact, power is removed and the wiper motor stops. After a pause (controlled by a variable resistor) the interval timer pulls in the governor relay to start another wipe.

When parking is complete, the wiper motor is braked to a stop by grounding the L and C terminals through the wiper motor switch. Braking takes place when the wiper motor switch moves to the PARK position. The wiper motor L terminal is grounded through the PARK contact of the wiper motor switch and the de-energized contact of the governor relay.

TROUBLESHOOTING HINTS

NO WIPERS IN INTERVAL POSITION

- Separate connector at wiper switch. Check at wiper switch for varying resistance between **BK** and **BK/PK** wires, while turning variable resistor. If faulty, replace or repair wiper switch. If good, replace or repair **Interval Governor.**

INTERVAL TIME TOO LONG

- With interval adjustment in maximum position, if time between wipes is more than 25 seconds, replace or repair governor.

WIPERS OPERATE IN HI SPEED ONLY

- Connect jumper wire from wiper switch case to ground. If LO speed is now OK, repair **BK** wire to **G502.** If LO speed is not OK, replace governor.

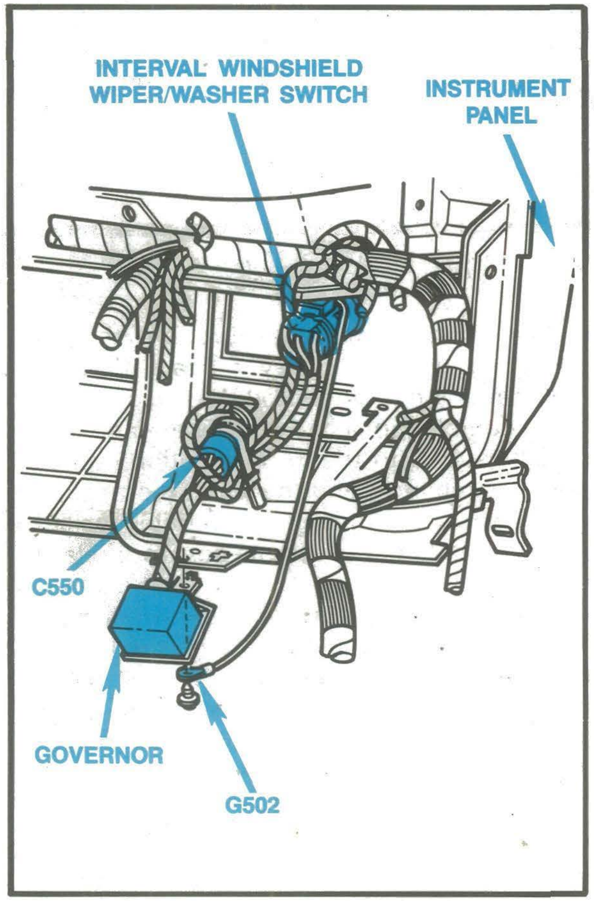


Figure 1 – Behind LH Corner of I/P

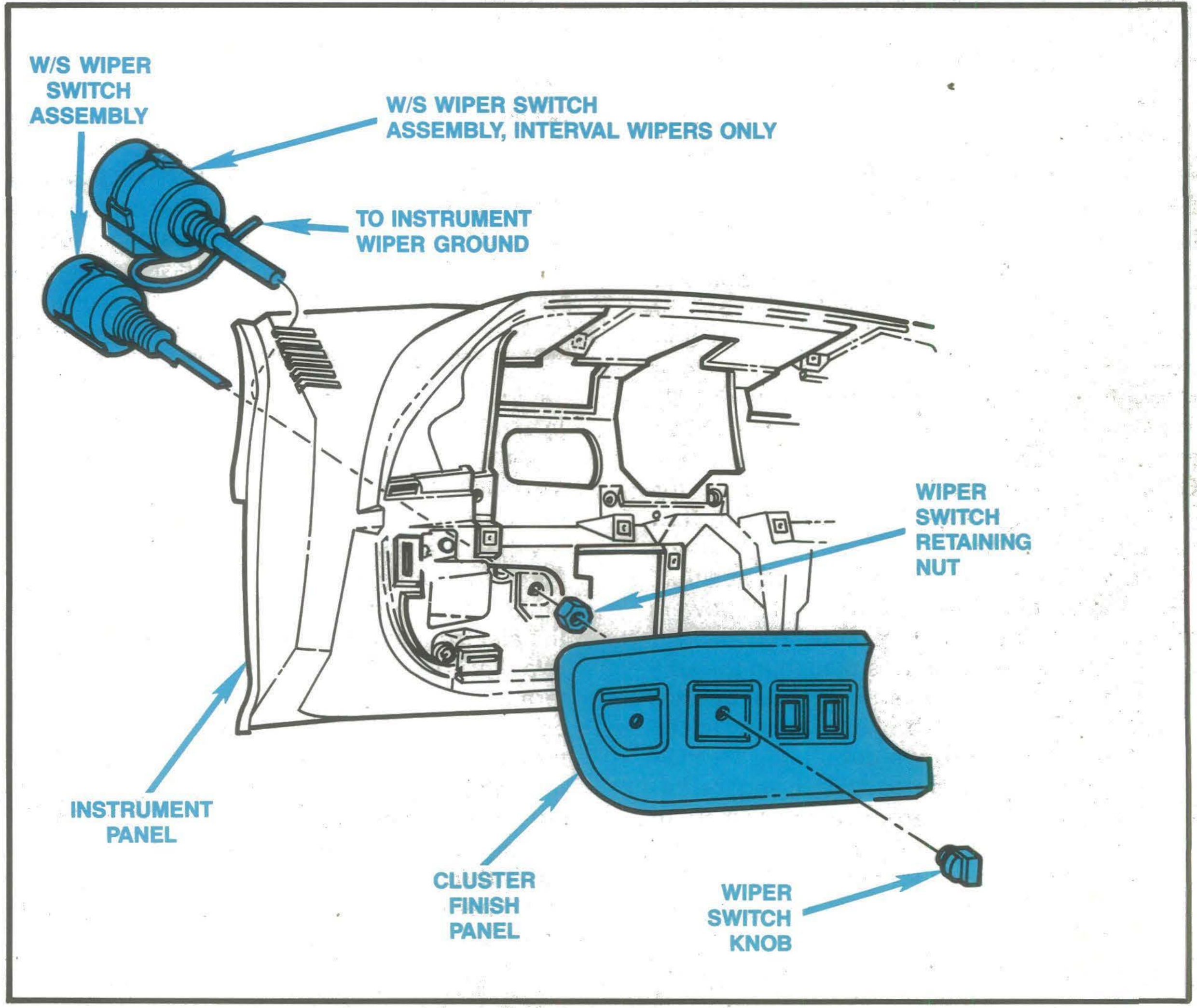
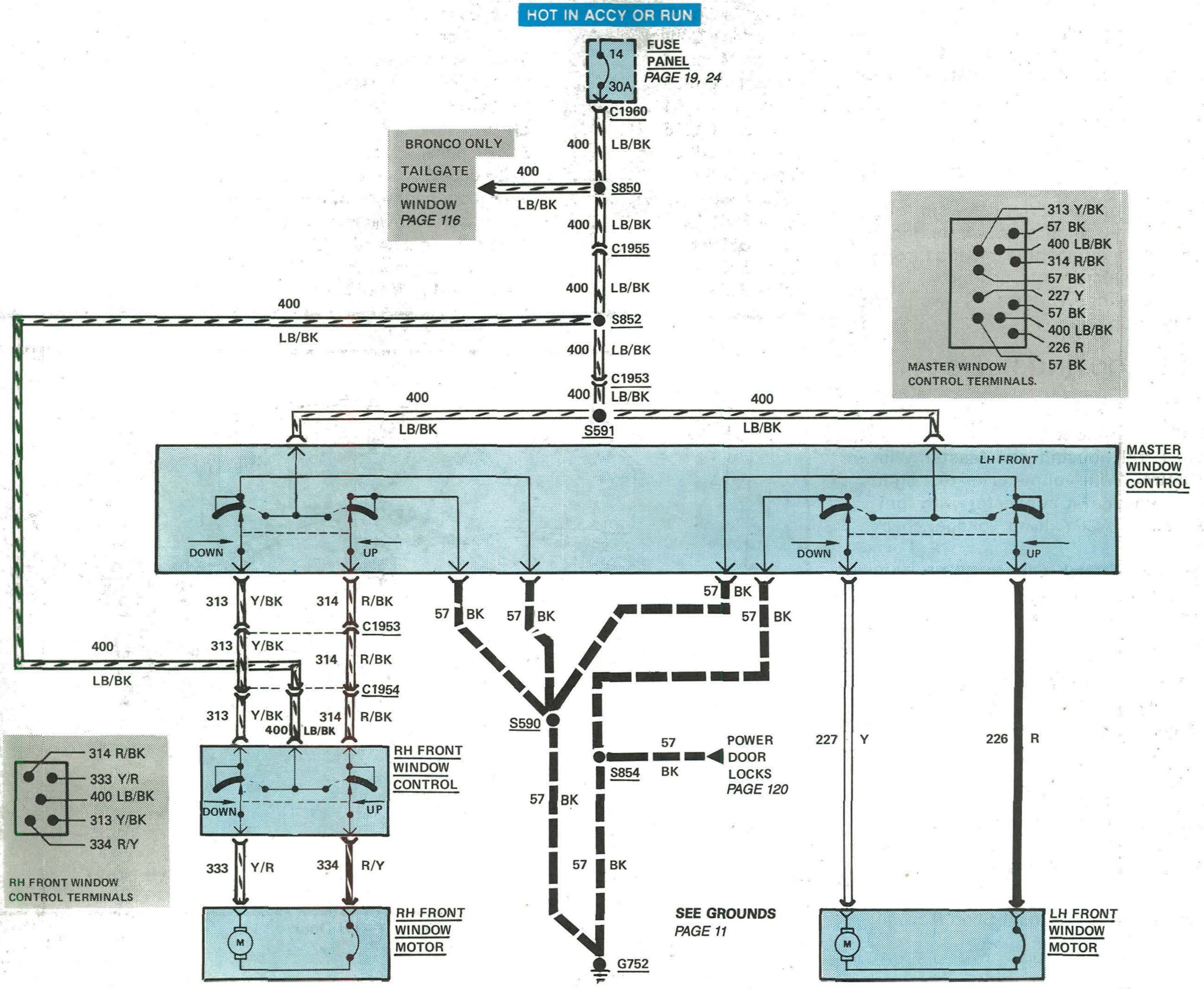

W/S WIPER SWITCH ASSEMBLY
W/S WIPER SWITCH ASSEMBLY, INTERVAL WIPERS ONLY
TO INSTRUMENT WIPER GROUND
WIPER SWITCH RETAINING NUT
INSTRUMENT PANEL
CLUSTER FINISH PANEL
WIPER SWITCH KNOB

Figure 2 — Main Light Switch


HOT IN ACCY OR RUN
14
30A
FUSE PANEL
PAGE 19, 24
C1960
400 LB/BK
BRONCO ONLY
TAILGATE POWER WINDOW
PAGE 116
400 LB/BK
S850
400 LB/BK
C1955
400 LB/BK
400 LB/BK
S852
400 LB/BK
C1953
400 LB/BK
400 LB/BK
S591
400 LB/BK
MASTER WINDOW CONTROL
LH FRONT
DOWN
UP
DOWN
UP
313 Y/BK
314 R/BK
C1953
313 Y/BK
314 R/BK
400 LB/BK
C1954
313 Y/BK
314 R/BK
400 LB/BK
57 BK
57 BK
57 BK
57 BK
S590
57 BK
S854
POWER DOOR LOCKS
PAGE 120
57 BK
57 BK
227 Y
226 R
RH FRONT WINDOW CONTROL
DOWN
UP
333 Y/R
334 R/Y
RH FRONT WINDOW MOTOR
M
SEE GROUNDS
PAGE 11
G752
LH FRONT WINDOW MOTOR
M
313 Y/BK
57 BK
400 LB/BK
314 R/BK
57 BK
227 Y
57 BK
400 LB/BK
226 R
57 BK
MASTER WINDOW CONTROL TERMINALS.
314 R/BK
333 Y/R
400 LB/BK
313 Y/BK
334 R/Y
RH FRONT WINDOW CONTROL TERMINALS

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, current flows from **Circuit Breaker 14** to the **Master Window Control** and the **RH Window Control.** These controls send current through the **Window Motors** in one direction for UP, and they reverse the current direction for DN.

In the "at rest" position, all switches ground both wires of each motor.

To raise the window, current flows through the UP side of the switch, through the motor, through the motor circuit breaker, and through the DN side of the switch to ground.

To lower the window, current flows in the opposite direction.

TROUBLESHOOTING HINTS

NO WINDOWS OPERATE

- Check **Circuit Breaker 14.**
- Remove bezel housing and **Master Window Control.** With voltmeter or test light, check for voltage at connector with **Ignition Switch** in ACCY. If no voltage, check continuity.
- With **Ignition Siwtch** Off, check for continuity to ground. If bad, repair **G752.**
- Perform "Power Window Switch Tests" as in Shop Manual.

ONE MOTOR DOESN'T WORK

- Remove **Master Window Control** from driver's door and test (read Shop Manual).
- If passenger's window motor doesn't work remove switch from passenger's door. Perform test in Shop Manual.
- If passenger's window motor doesn't work check continuity of wires between **Master Window Control** and **RH Window Control** connectors.
- Remove window motor (read Shop Manual).

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Master Window Control	In LH door	115-2		
RH Window Control	In RH door	115-3		
Window Motors	In respective doors	114-1		
Connector C1953	LH cowl center access hole		GY	8
Connector C1954	RH cowl center access hole		GN	8
Connector C1955	LH cowl area		BL	1
Connector C1960	At fuse panel		N	1
Ground G752	In LH door	114-1		
Splice S590	In LH door near window control switch T/O			
Splice S591	In LH door near window control switch T/O			
Splice S850	Near main light switch T/O			
Splice S852	Near LH master window control switch T/O			
Splice S854	Near 4 × 4 indicator lamp T/O			

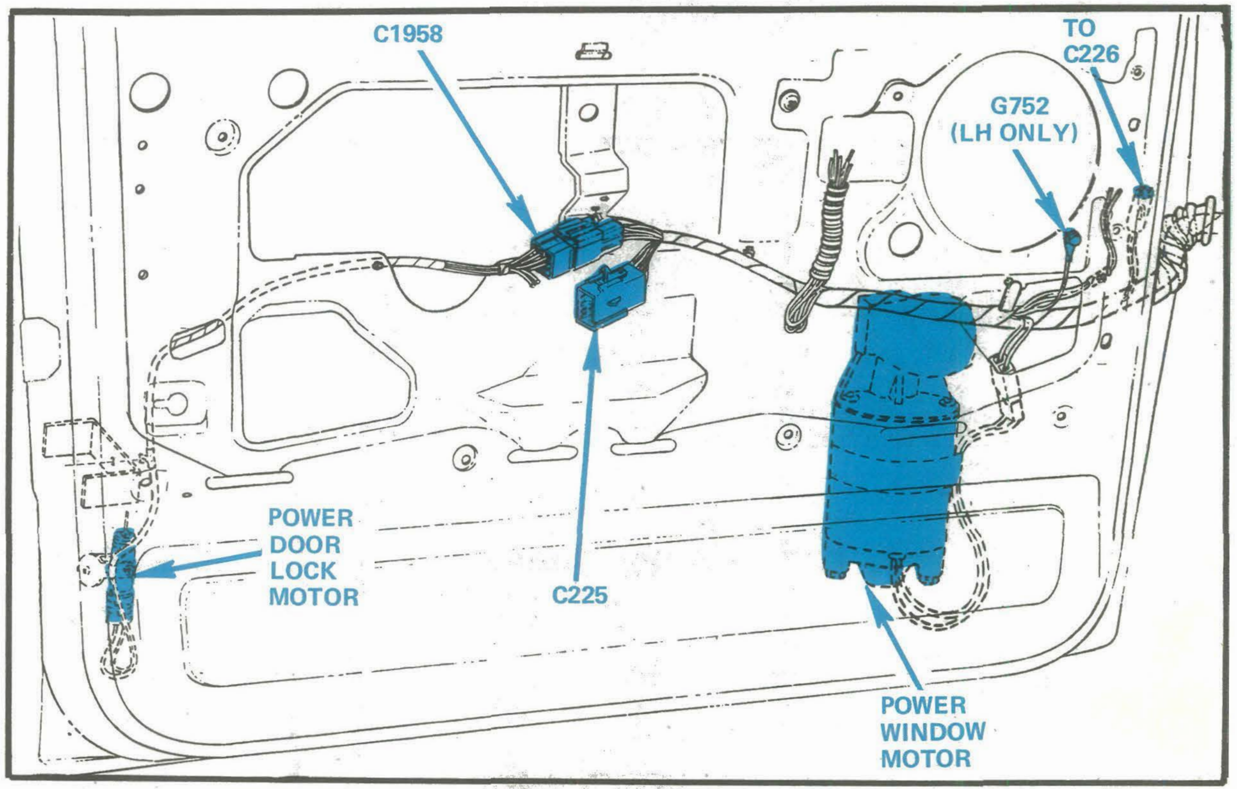


Figure 1 — LH Door

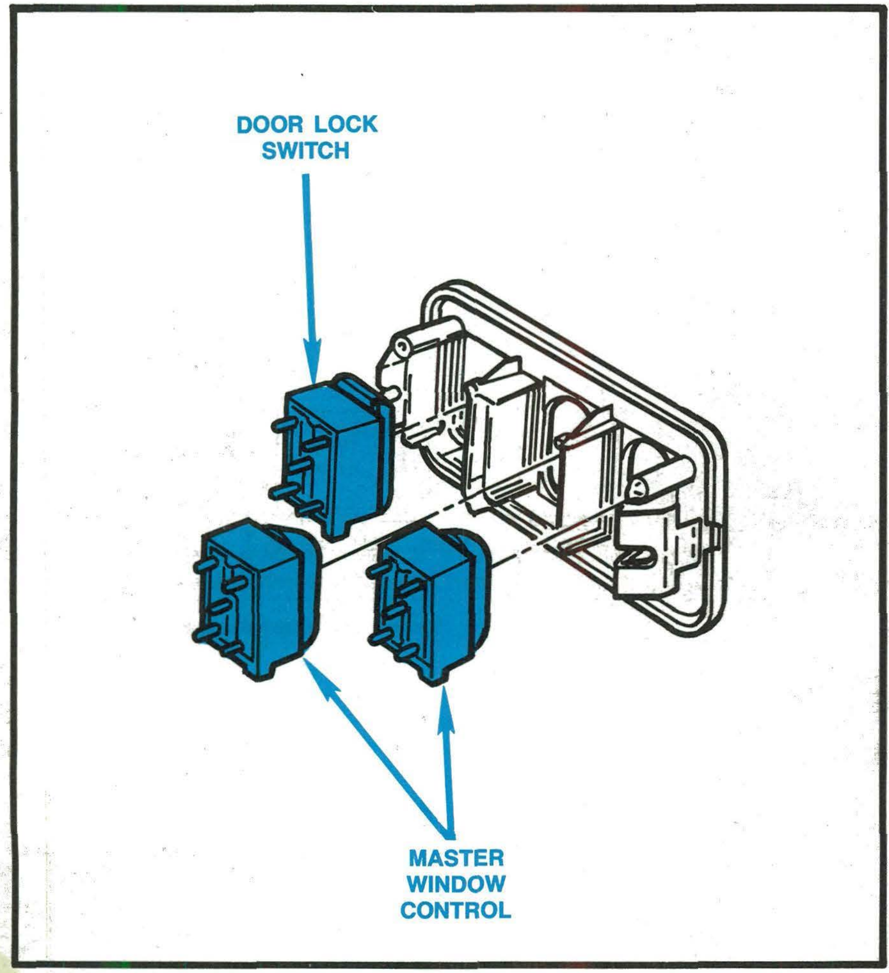


Figure 2 – LH Door

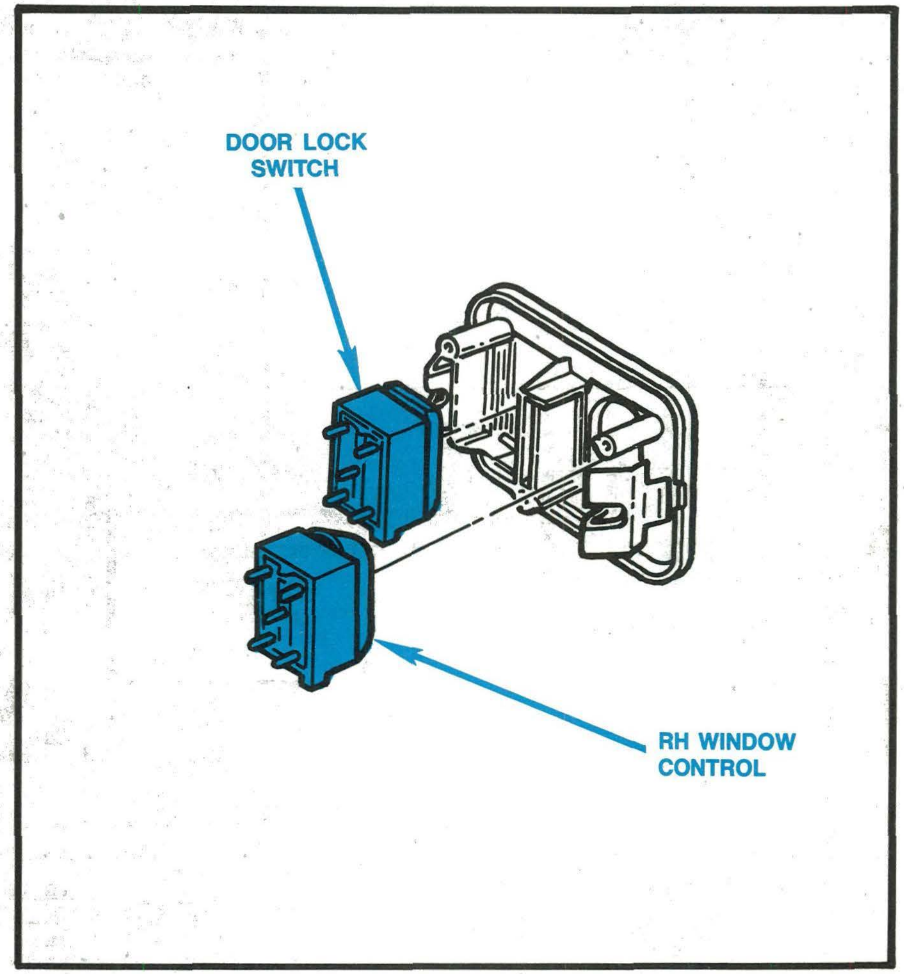
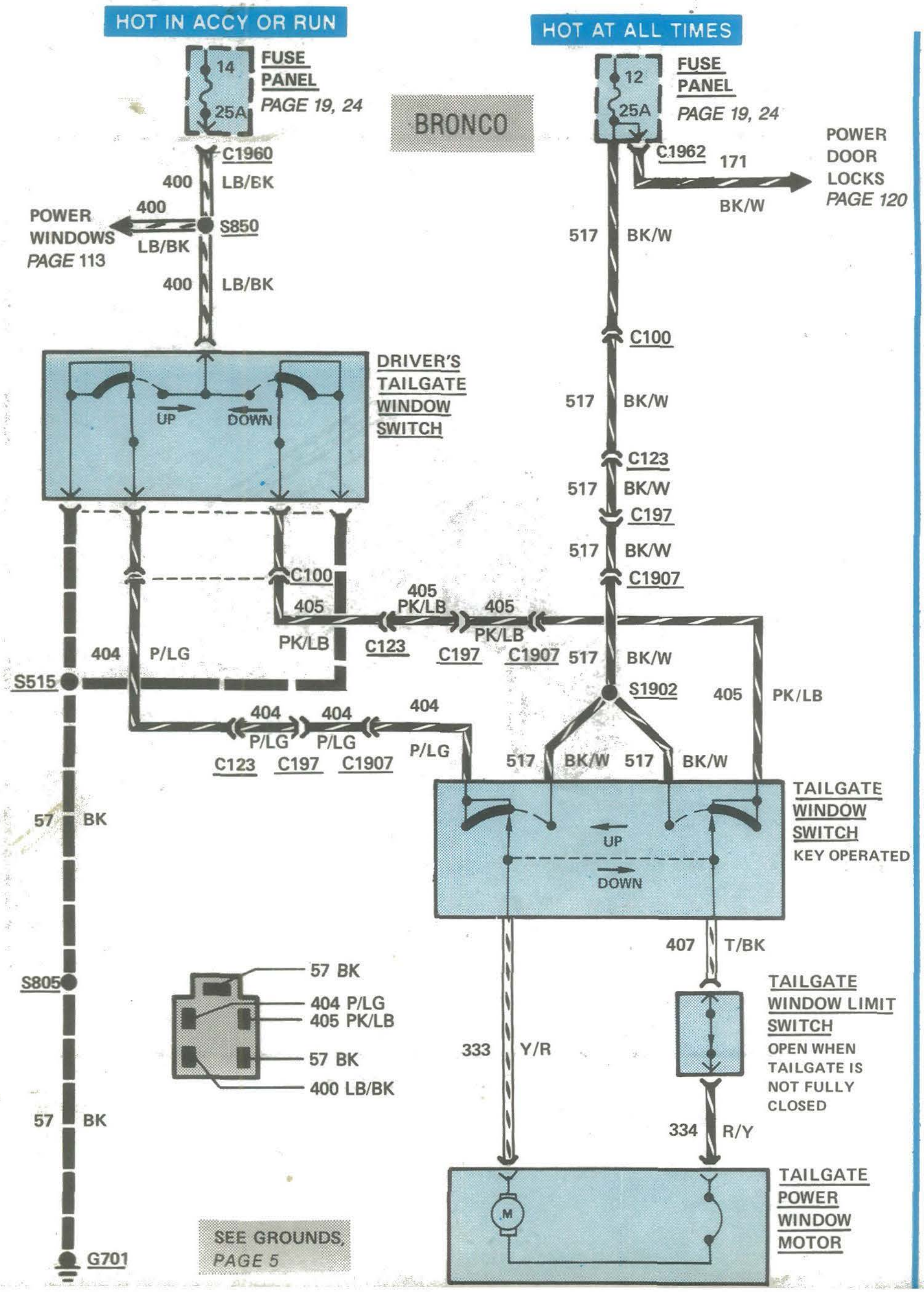
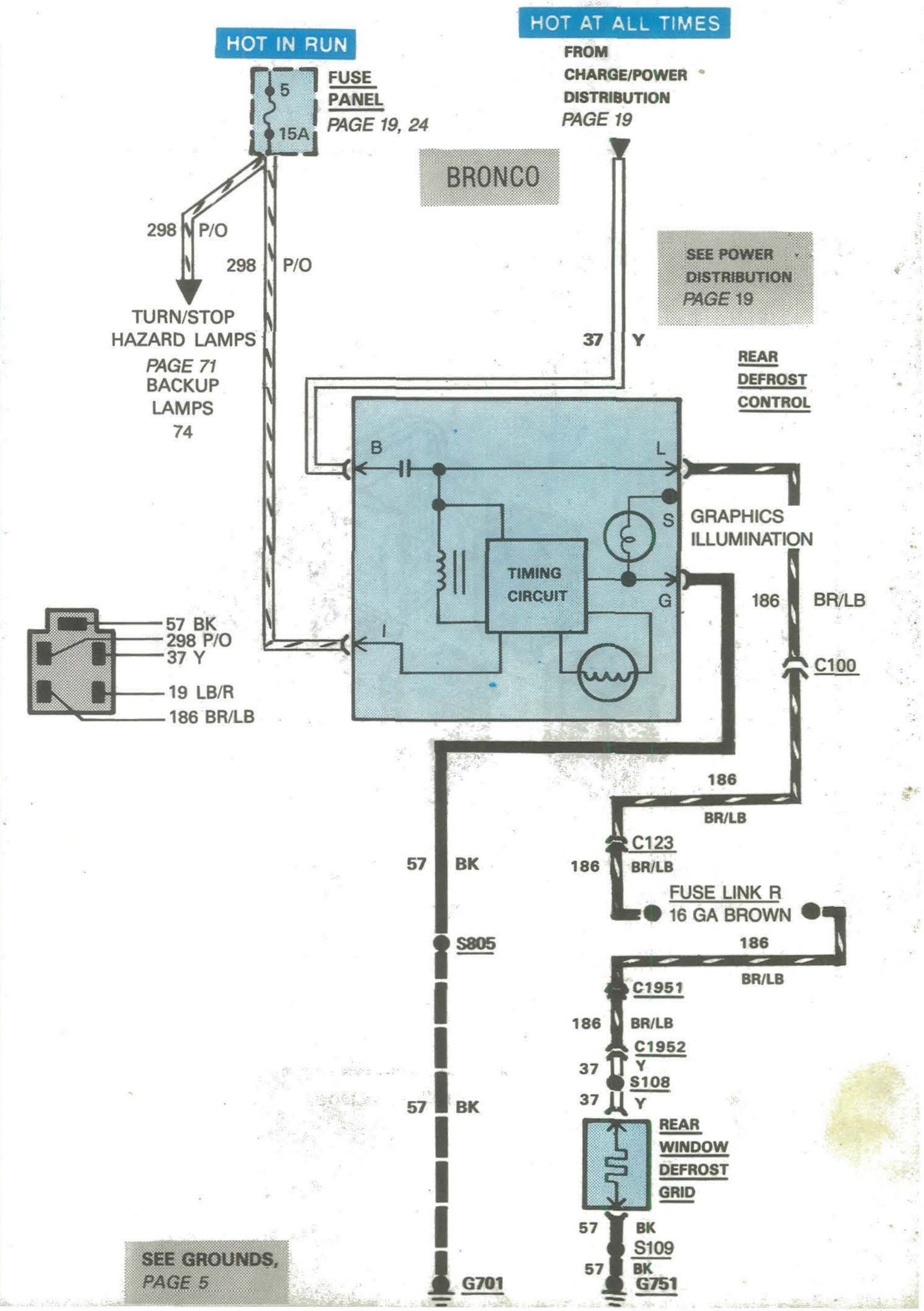


Figure 3 – RH Door

TAILGATE POWER WINDOW/REAR WINDOW DEFROST





TAILGATE POWER WINDOW

HOW THE CIRCUIT WORKS

With **Ignition Switch** in ACCY or RUN, voltage is applied through **Fuse 14** to the **Driver's Tailgate Window Switch** on the instrument panel to run the **Tailgate Power Window Motor.**

The **Tailgate Window Limit Switch** does not allow the motor to run with the tailgate open.

Voltage is applied at all times through **Fuse 12** to the **Key Switch** in the tailgate to run the motor.

Either switch assembly sends current through the motor in one direction for UP, and the opposite direction for DN.

In OFF position, both motor wires are grounded through separate switches.

When the DN switch is pushed, power flows to the DN motor lead. The UP lead acts as ground.

When the UP switch is pushed, power flows to the UP motor lead. The DN lead acts as ground.

TROUBLESHOOTING HINTS

WINDOW WORKS FROM KEY SWITCH BUT NOT FROM DRIVER'S SWITCH

- Check **Fuse 14.**
- Check continuity of **Driver's Tailgate Window Switch** while in UP or DN position.

WINDOW WORKS FROM DRIVER'S SWITCH BUT NOT FROM KEY SWITCH

- Check **Fuse 12.**
- Check continuity of **Key Switch** while in UP or DN position.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Rear Defrost Control	Under LH corner of I/P	118-1		
Driver's Tailgate Window Switch	LH side of I/P	118-1		
Fuse Link R				
Tailgate Power Window Motor	In center of tailgate	119-3		
Tailgate Window Limit Switch	LH latch			
Key Switch	LH side of tailgate	119-3		
Connector C100	LH side thru dash			53
Connector C123	LH side of frame at rear crossmember	119-1	BK	4
Connector C197	LH side rear cross support		GY	3
Connector C1907	Behind LH rear lamp	119-4	BR	3
Connector C1951	Behind LH rear crossmember	119-5	BR	1
Connector C1952	Behind LH rear lamp	119-4	BR	1
Connector C1960	On fuse panel		N	1
Connector C1962	On fuse panel		BL	1
Ground G701	Behind I/P near center			
Ground G751	At LH side of tailgate			
Splice S108	Near tailgate power window switch T/O			
Splice S109	Near tailgate power window switch T/O			
Splice S515	Near driver's tailgate window switch T/O			
Splice S805	Near cigar lighter T/O			
Splice S850	Near main light switch T/O			
Splice S1902	Near tailgate power window switch T/O			

REAR WINDOW DEFROST

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, the **Rear Defrost Control** is powered through **Fuse 5.**

Pressing the momentary defrost switch ON closes the contacts of the defrost relay and starts the ten minute (approximate) timing cycle. Current now flows through **Fuse Link R** to the **Rear Window Defrost Grid.** When the defrost switch is released from ON, the solid-state circuitry keeps the defrost relay coil energized.

Pressing the defrost switch OFF drops out the defrost relay. This removes power from the defrost circuit.

If the OFF switch is not pressed, power will remain on until the time delay runs out. Then the coil will drop out and remove power from the defrost circuit.

TROUBLESHOOTING HINTS

NO DEFROST OPERATION

- Check **Fuse 5.**
- Check that the defrost switch relay operates when switch is turned on and off.
- Check power on **Y** wire at the defrost switch relay.
- Check **Fuse Link R.**

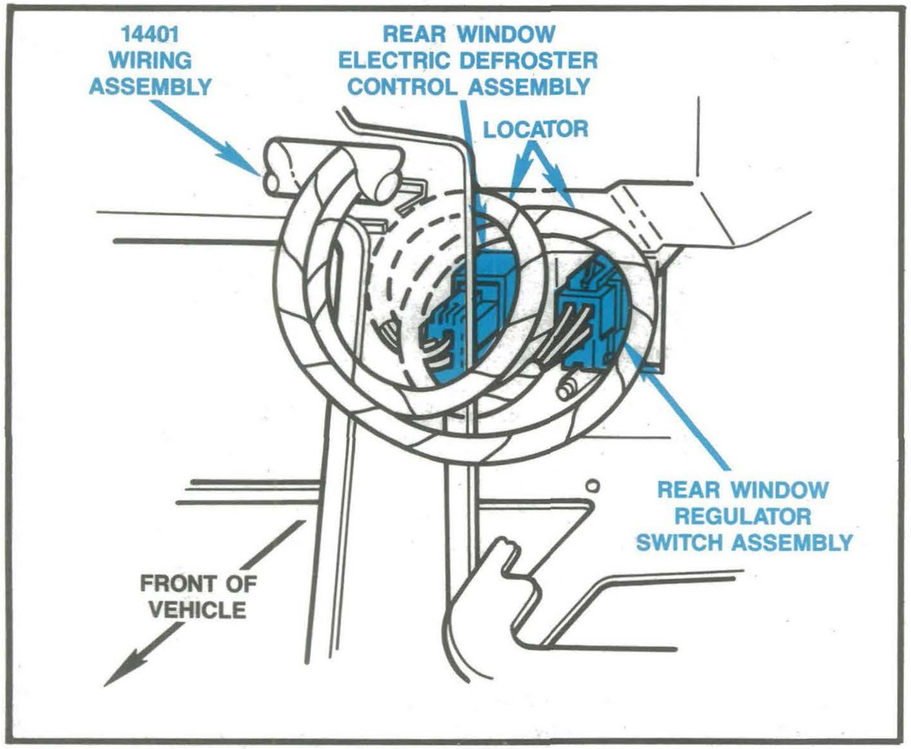


Figure 1 — Rear Window Electric Defrost Control Wiring Installation and Rear Window Regulator Switch Assembly Wiring Installation

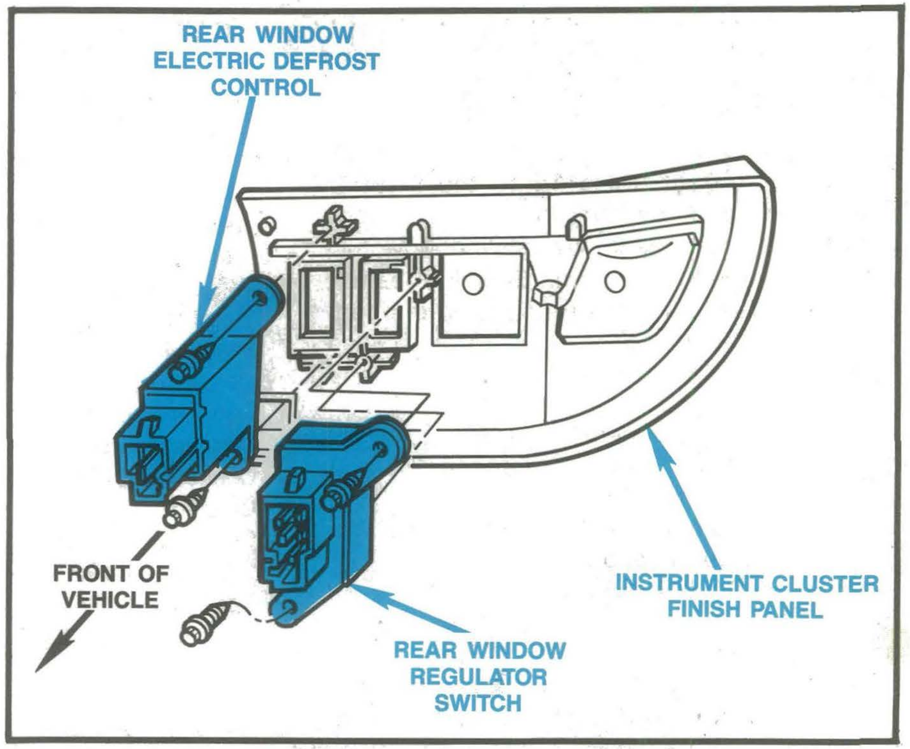


Figure 2 — Rear Window Electric Defrost Control and Rear Window Regulator Switch (Rear View)

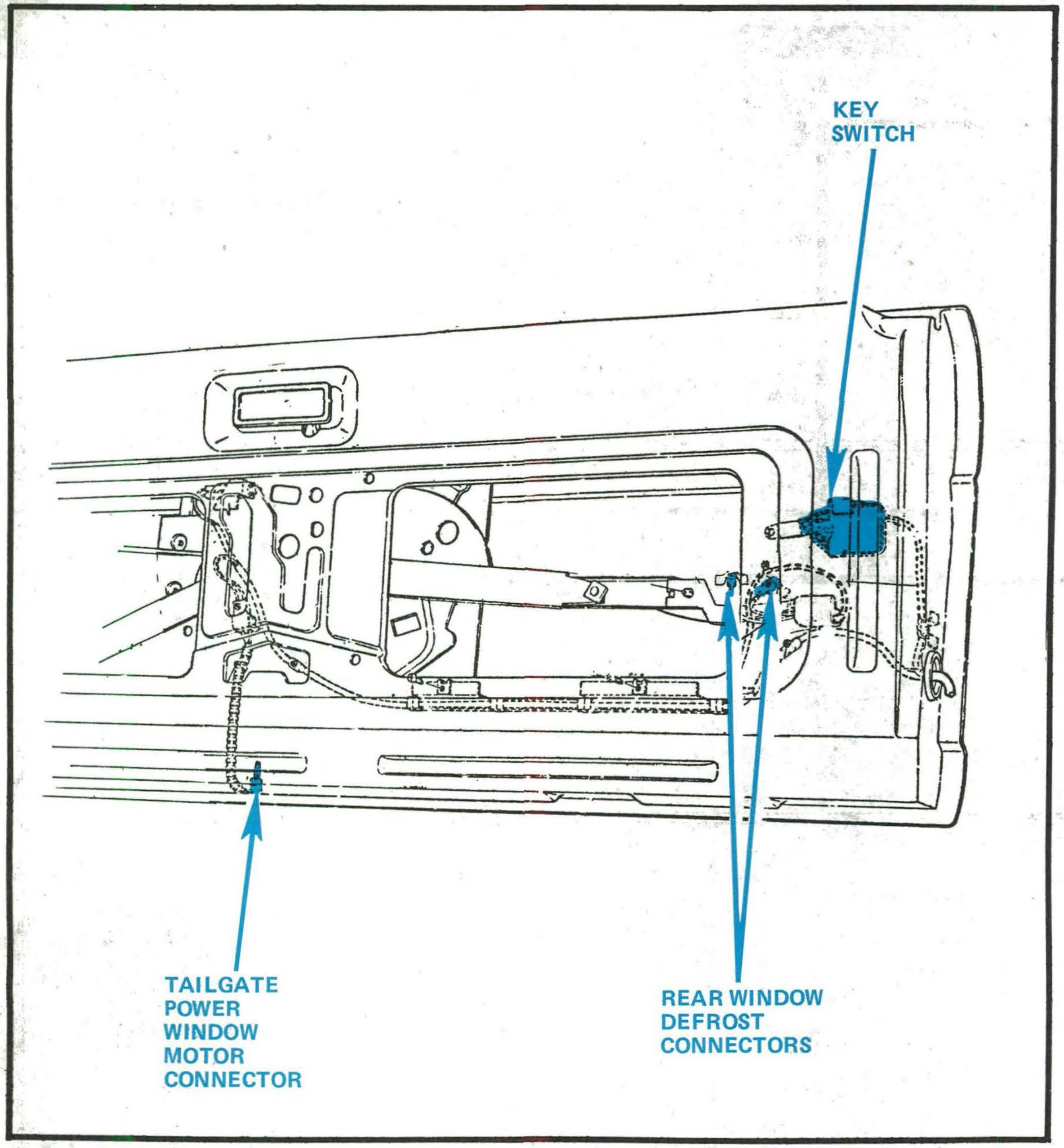

KEY SWITCH
TAILGATE POWER WINDOW MOTOR CONNECTOR
REAR WINDOW DEFROST CONNECTORS

Figure 3—Tailgate (Bronco)

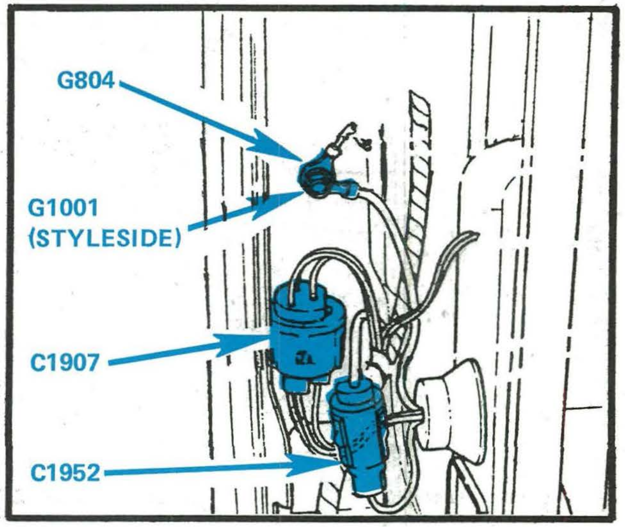


Figure 4—Rear LH Light Assembly

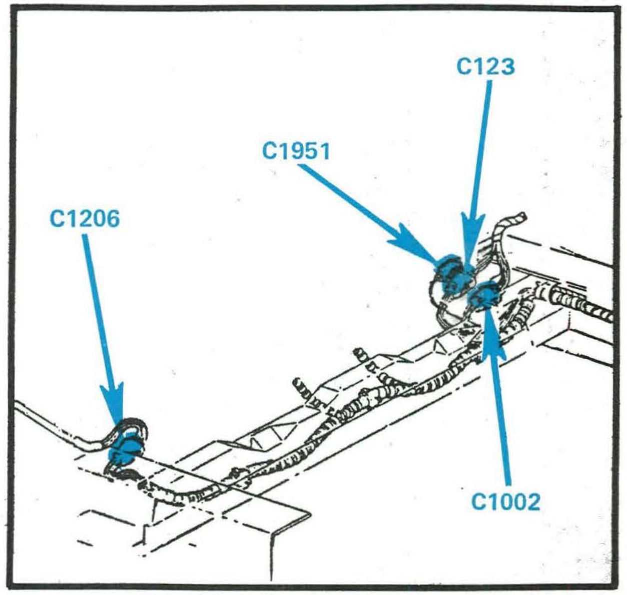
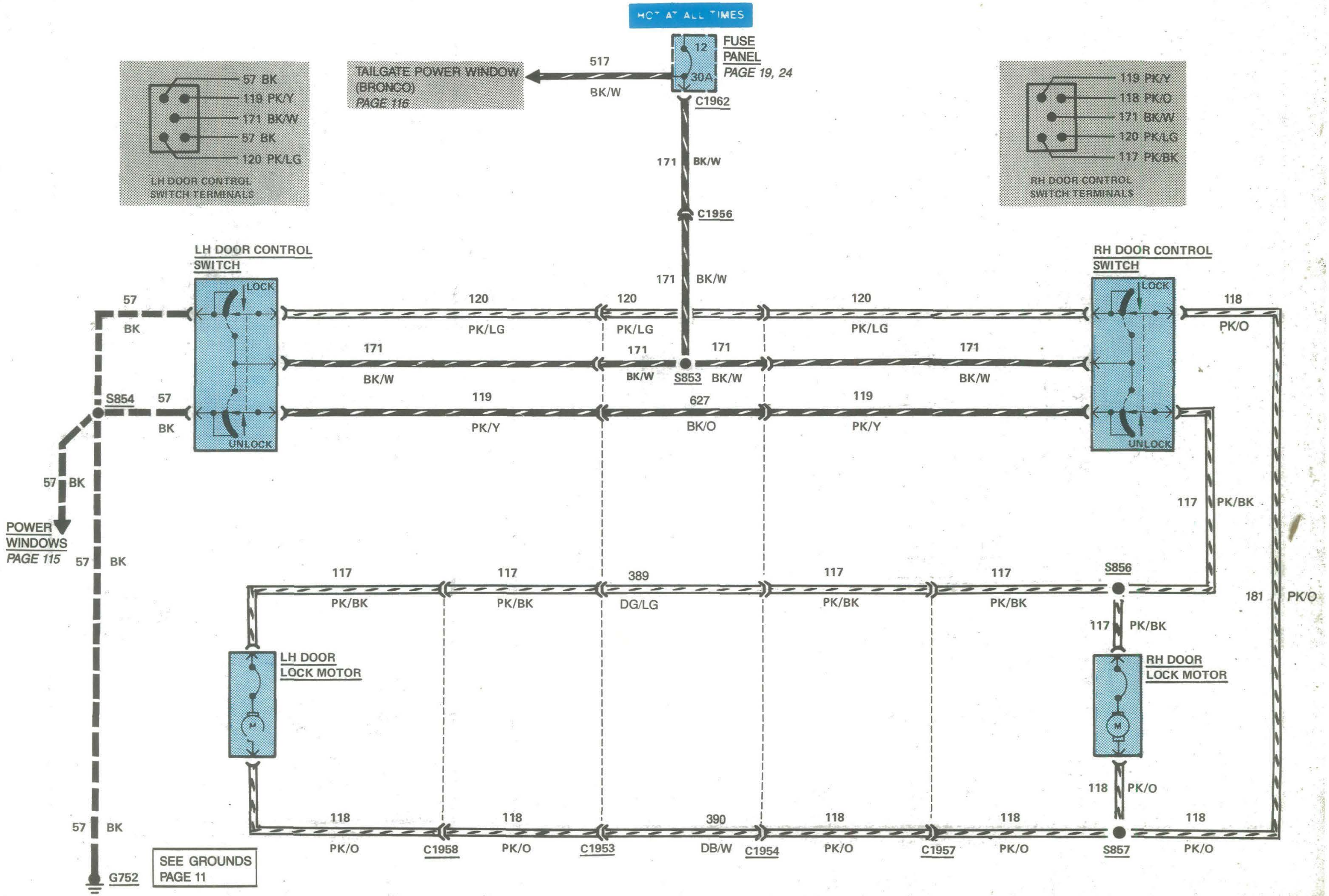


Figure 5—At Rear Crossmember

POWER DOOR LOCKS



HOW THE CIRCUIT WORKS

Power Door Locks are powered through **Circuit Breaker 12** (hot at all times).

When either **Door Control Switch** is pressed to LOCK, power is sent to both **Door Lock Motors.** The motors turn in the direction to lock the locks. When either switch is pressed to UNLOCK, power of opposite polarity is sent to the **Door Lock Motors,** turning them in the UNLOCK direction. When "at rest," the switches are grounded.

TROUBLESHOOTING HINTS

NO LOCKS WORK

- Check (circuit breaker). Check for voltage at **C1956.**

ONE DOOR DOES NOT LOCK (UNLOCK)

- Remove door trim panel and watershield. Check continuity of motor. Check door lock mechanism.

ONE SWITCH DOES NOT WORK

- Remove switch. See Section 44-16 of Shop Manual. Check for power and ground at connector.
- See "Single Switch Test" in Section 42-01 of Shop Manual.

COMPONENT LOCATION

COMPONENT LOCATION		Page-Figure	Color	Terminals
Door Lock Motors	In respective door	121-2		
Door Lock Switches	In respective doors	121-1		
Connector C1953	LH cowl center access hole		GY	8
Connector C1954	RH cowl center access hole	122-3	GR	8
Connector C1956	LH cowl area		N	1
Connector C1957	In RH door	121-2	BK	2
Connector C1958	In LH door	114-1	BK	2
Connector C1962	At fuse panel		BL	1
Ground G752	In LH door	114-1		
Splice S853	Near LH master window control T/O			
Splice S856	Near RH front door lock motor T/O			
Splice S857	Near RH front door lock motor T/O			
Splice S858	Near LH master window control T/O			

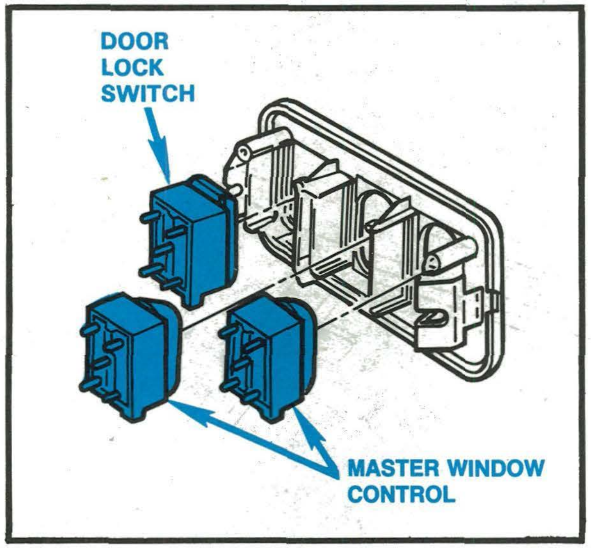


Figure 1 — LH Door

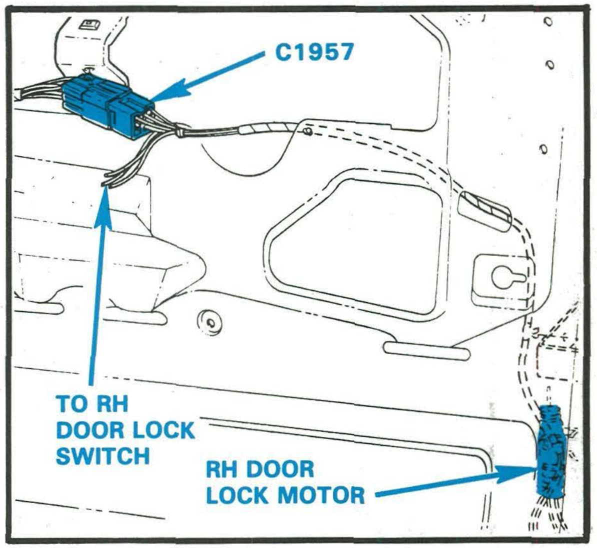


Figure 2 — Inside Rear of RH Door

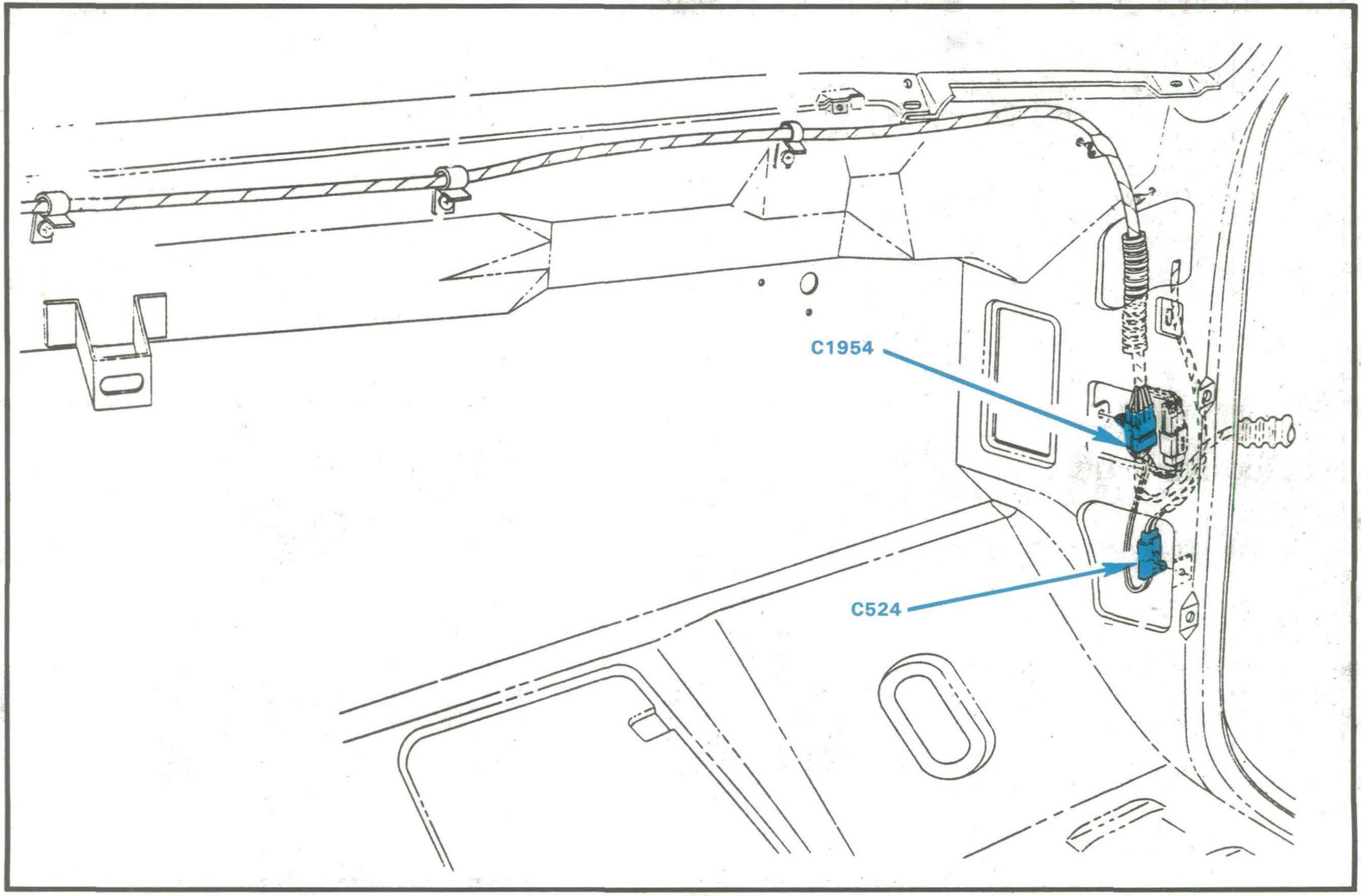
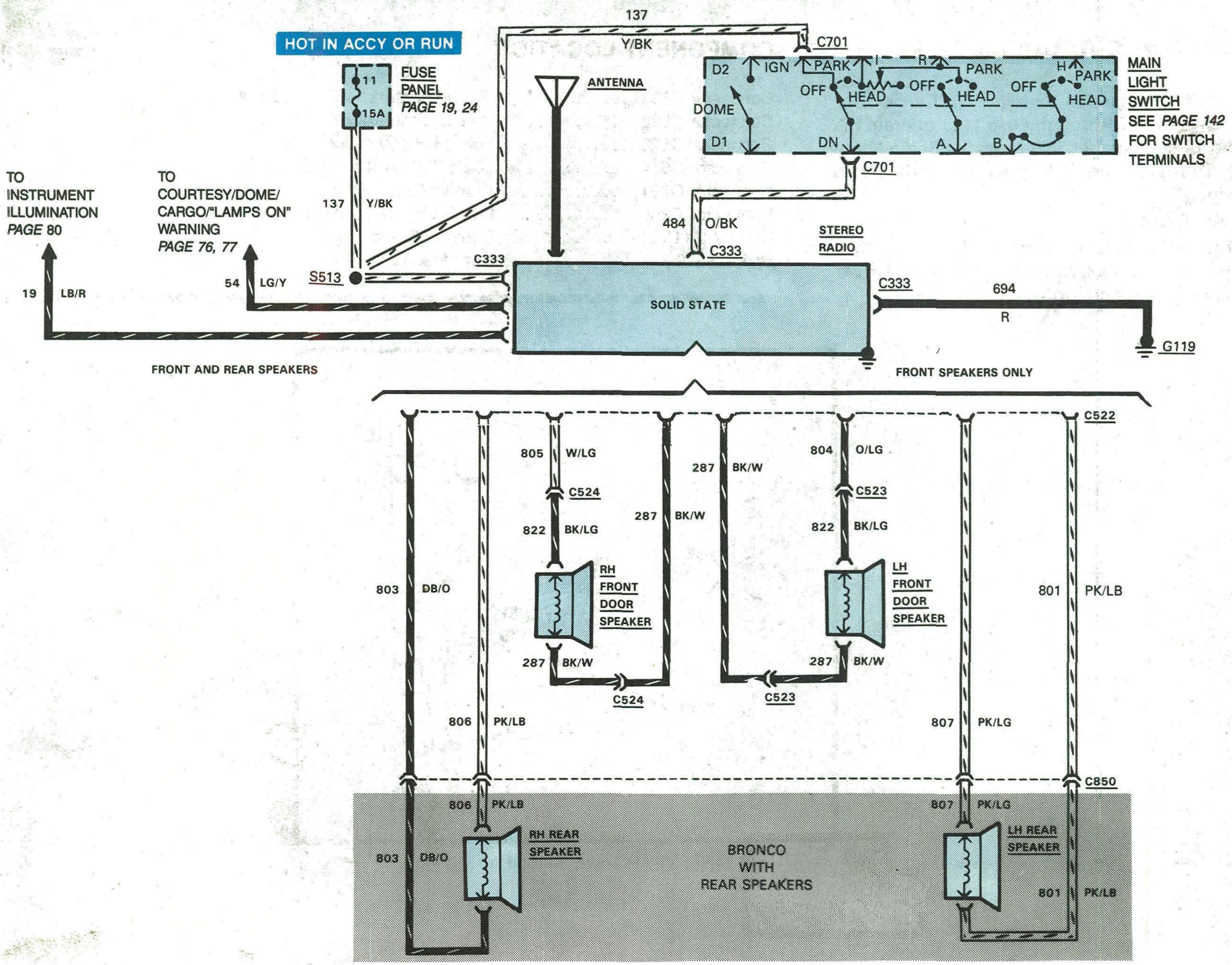


Figure 3 —RH Cowl Center Access Hole


HOT IN ACCY OR RUN
11
15A
FUSE PANEL PAGE 19, 24
137
Y/BK
C701
ANTENNA
D2
IGN
PARK
R
PARK
H
PARK
MAIN LIGHT SWITCH
SEE PAGE 142 FOR SWITCH TERMINALS
OFF
HEAD
OFF
HEAD
OFF
HEAD
DOME
D1
DN
A
B
C701
TO INSTRUMENT ILLUMINATION PAGE 80
TO COURTESY/DOME/ CARGO/"LAMPS ON" WARNING PAGE 76, 77
137
Y/BK
484
O/BK
STEREO RADIO
C333
C333
S513
54
LG/Y
19
LB/R
SOLID STATE
C333
694
R
G119
FRONT AND REAR SPEAKERS
FRONT SPEAKERS ONLY
C522
805
W/LG
C524
822
BK/LG
287
BK/W
287
BK/W
804
O/LG
C523
822
BK/LG
RH FRONT DOOR SPEAKER
LH FRONT DOOR SPEAKER
803
DB/O
801
PK/LB
287
BK/W
C524
C523
287
BK/W
806
PK/LB
807
PK/LG
C850
806
PK/LB
807
PK/LG
RH REAR SPEAKER
LH REAR SPEAKER
803
DB/O
BRONCO WITH REAR SPEAKERS
801
PK/LB

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, current can flow through **Fuse 11** to operate the radio. Circuit number 54 powers the Radio Memory. Circuit number 484 powers the LCD Radio Lighting.

Stereo Radio

The AM/FM/MPX **Stereo Radio** has two **Front Door Speakers** and two optional **Rear Speakers** (Bronco only).

COMPONENT LOCATION

COMPONENT LOCATION		Page-Figure	Color	Terminals
Connector C333	Behind center of I/P at radio			8
Connector C522	Behind center of I/P at radio			8
Connector C523	Lower LH cowl access hole		BR	2
Connector C524	Lower RH cowl access hole	124-1	BR	2
Connector C701	At main light switch		BK	8
Connector C850	Lower LH cowl access hole		GY	4
Ground G119	Behind I/P near center			
Splice S513	Near fuse panel T/O			

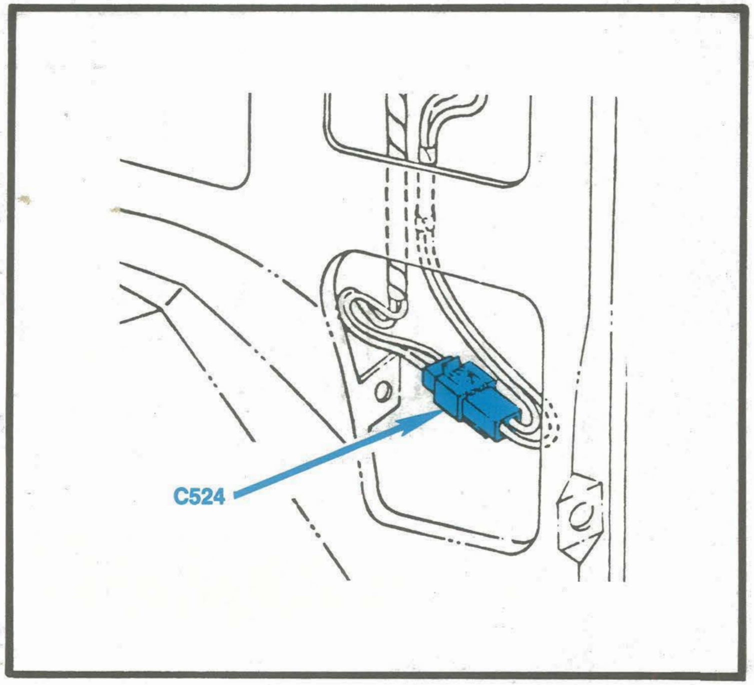
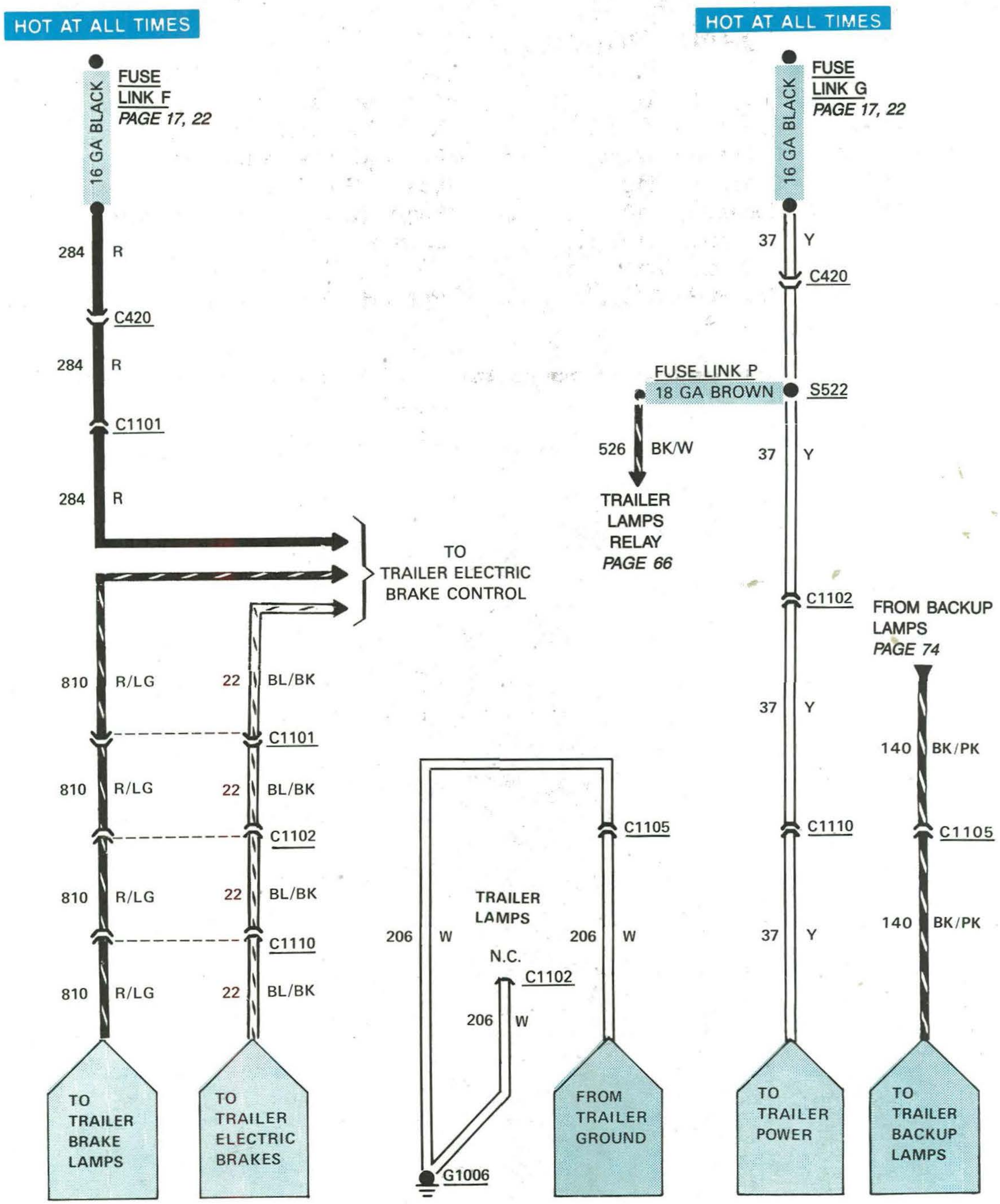


Figure 1—RH Lower Shroud Access Hole


HOT AT ALL TIMES
16 GA BLACK
FUSE LINK F
PAGE 17, 22
284 R
C420
284 R
C1101
284 R
TO TRAILER ELECTRIC BRAKE CONTROL
810 R/LG
22 BL/BK
C1101
810 R/LG
22 BL/BK
C1102
810 R/LG
22 BL/BK
C1110
810 R/LG
22 BL/BK
TO TRAILER BRAKE LAMPS
TO TRAILER ELECTRIC BRAKES
TRAILER LAMPS
206 W
206 W
C1105
N.C.
C1102
206 W
G1006
FROM TRAILER GROUND
HOT AT ALL TIMES
16 GA BLACK
FUSE LINK G
PAGE 17, 22
37 Y
C420
FUSE LINK P
18 GA BROWN
S522
526 BK/W
TRAILER LAMPS RELAY
PAGE 66
37 Y
C1102
37 Y
C1110
37 Y
TO TRAILER POWER
FROM BACKUP LAMPS
PAGE 74
140 BK/PK
C1105
140 BK/PK
TO TRAILER BACKUP LAMPS

HOW THE CIRCUIT WORKS

Power for the **Camper** or **Trailer** circuits is provided through fuse links at the **Starter Relay**. Trailer exterior lamps and accessories are powered through **Fuse Link G**. Trailer brakes and brake lamps are powered through **Fuse Link F**.

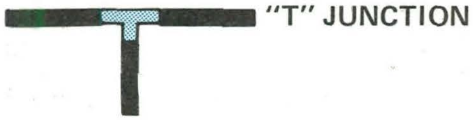
TROUBLESHOOTING HINTS

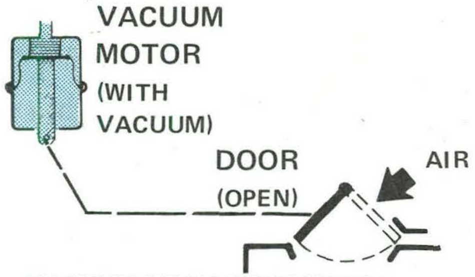
TRAILER LAMPS DON'T WORK

- Check fuse link.
- Check in-line connectors.

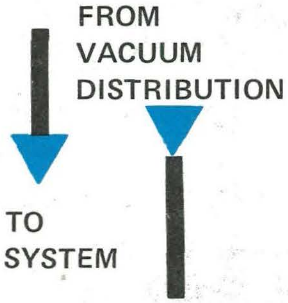
COMPONENT LOCATION

		Page-Figure	Color	Terminals
Fuse Link F, G	At starter relay			
Fuse Link P	Near trailer lamps relay			
Connector C420	Engine Compartment LH side		BK	4
Connector C1101	Behind I/P LH end		BK	3
Connector C1102	Engine compartment LH at dash		BR	6
Connector C1105	LH side of frame at rear crossmember		BK	2
Connector C1110	LH rear engine compartment	69-9	BR	6
Ground G1006	Rear LH side of frame at rear crossmember	69-9		
Splice S522	Near trailer lamp relay T/O			



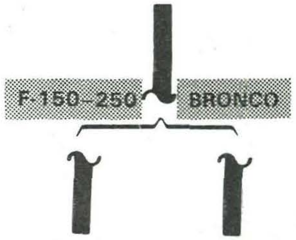


VACUUM ON VACUUM MOTOR PULLS DOOR OPEN TO LET AIR PASS THROUGH



"CUT" HOSES REFERENCED BETWEEN PAGES

ARROW SHOWS VACUUM FLOW FROM MANIFOLD FITTING TO COMPONENT



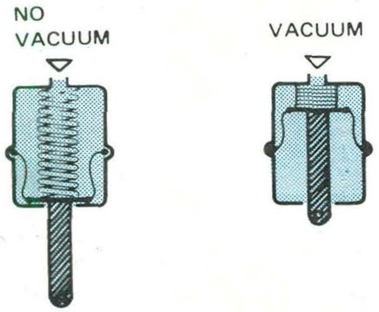
ALTERNATE VACUUM PATHS

NOTE

Other vacuum symbols used on vacuum system diagrams are fully explained on those pages.

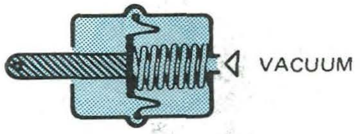
VACUUM MOTOR OPERATIONS

SINGLE DIAPHRAGM MOTOR



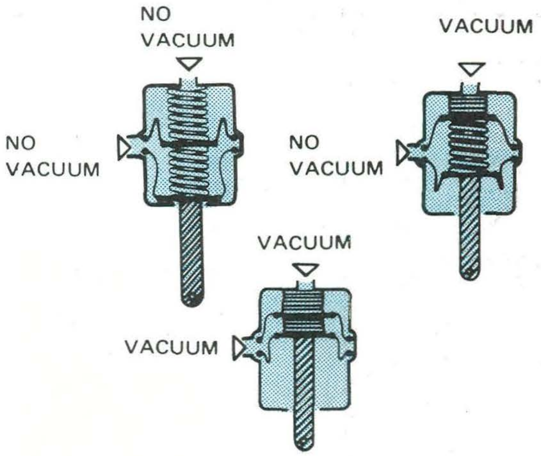
Vacuum motors operate like electrical solenoids, mechanically pushing or pulling a shaft between two fixed positions. When vacuum is applied, the shaft is pulled in. When no vacuum is applied, the shaft is pushed all the way out by a spring.

SERVO MOTOR



Some vacuum motors such as the **Servo Motor** in the **Speed Control** can position the actuating arm at any position between fully extended and fully retracted. The **Servo** is operated by a control valve that applies varying amounts of vacuum to the motor. The higher the vacuum level, the greater retraction of the motor arm. **Servo** motors work exactly the same as the two-position motors; the only difference is in the way the vacuum is applied. **Servo Motors** are generally larger and provide a calibrated control.

DOUBLE DIAPHRAGM MOTOR



A double diagram motor has three positions, it is really two motors in one housing. When the top port gets vacuum, the shaft pulls half-way in. When both ports get vacuum, the shaft pulls all the way in.

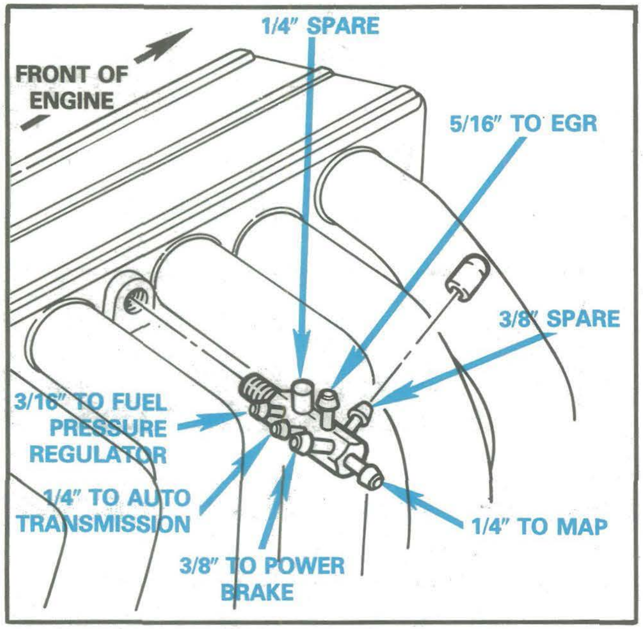


Figure 1 – 4.9L

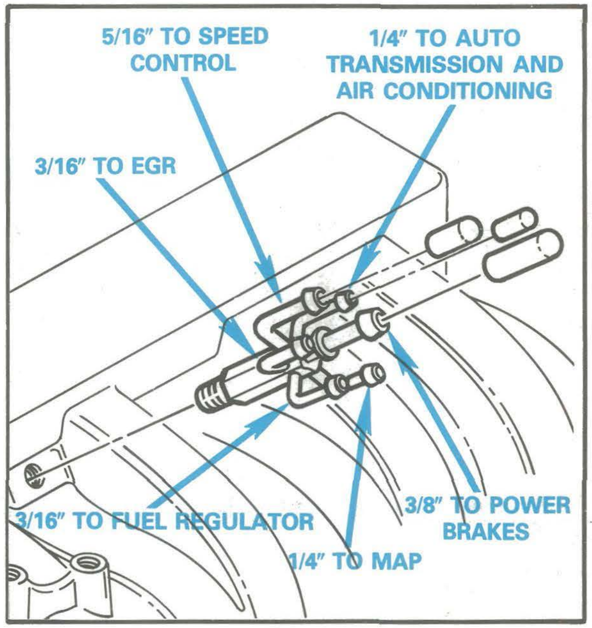


Figure 2 – 5.0L

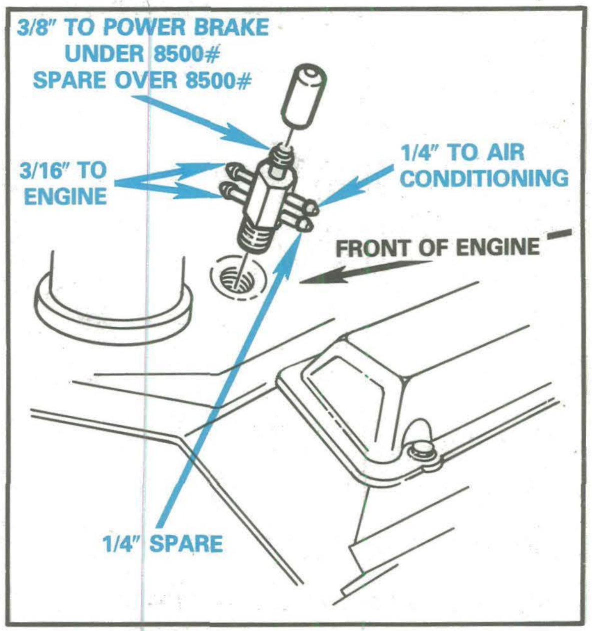


Figure 3 – 5.8L Front Fitting

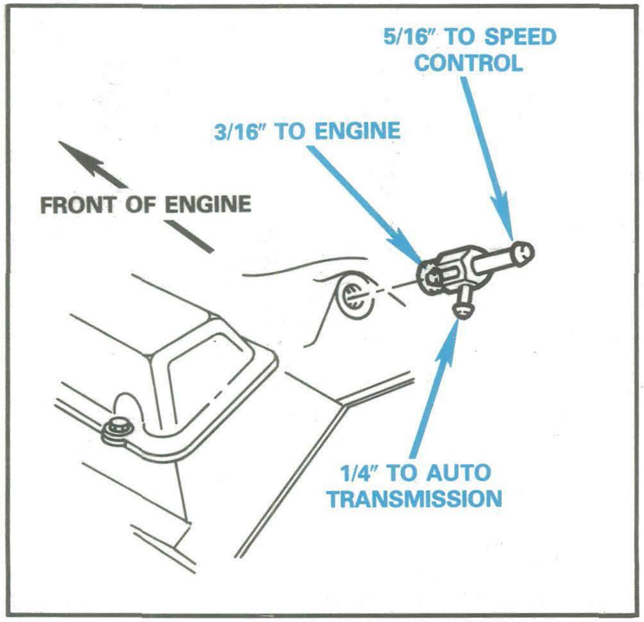


Figure 4 – 5.8L Under 8500# Rear Fitting

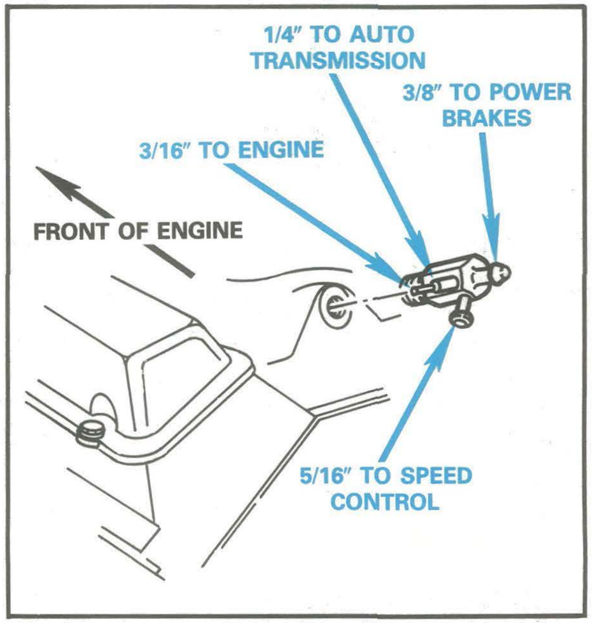


Figure 5 – 5.8L Over 8500# Rear Fitting

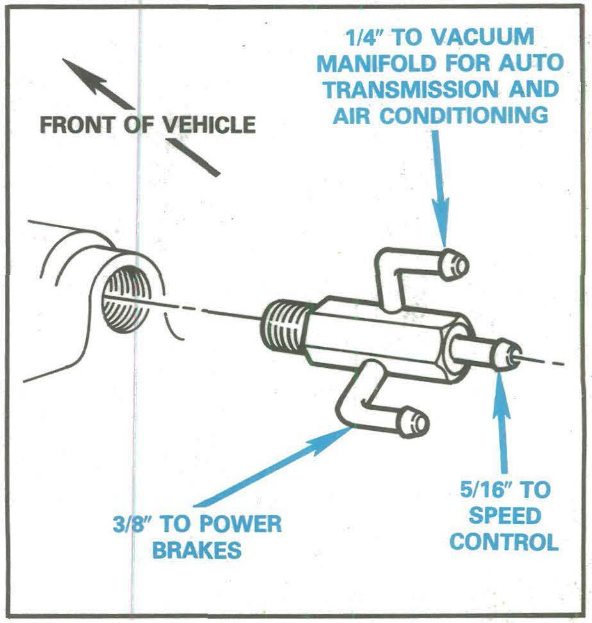

FRONT OF VEHICLE
1/4" TO VACUUM MANIFOLD FOR AUTO TRANSMISSION AND AIR CONDITIONING
3/8" TO POWER BRAKES
5/16" TO SPEED CONTROL

Figure 6 – 7.5L

TROUBLESHOOTING STEPS

These six steps present an orderly method of troubleshooting:

Step 1. Verify the problem.

- Operate the complete system and see all symptoms for yourself in order to:
  - — check the accuracy and completeness of the customer's complaint.
  - —learn more that might give a clue to the nature and location of the problem.

Step 2. Narrow the problem.

- Using the EVTM, narrow down the possible causes and locations of the problem in order to more quickly find the exact cause.

Step 3. Test the cause.

- Use test procedures to find the specific cause of the symptoms.

Step 4. Verify the cause.

- Confirm the fact that you have found the correct cause through operating the parts of the circuit you think are good.

Step 5. Make the repair.

- Repair or replace the faulty component.

Step 6. Verify the repair.

- Operate the system as in Step 1 and check that your repair has removed all symptoms, and also has not caused any new symptoms.

TROUBLESHOOTING TESTS

> NOTE
>
> Vacuum system problems fall into three groups:
>
> 1. *Leaks* in hoses, connectors, or motor diaphragms.
> 2. *Pinched Lines* or *Clogged Valves*.
> 3. *Faulty mechanical operation* of parts driven by vacuum motors.

Vacuum Supply Test

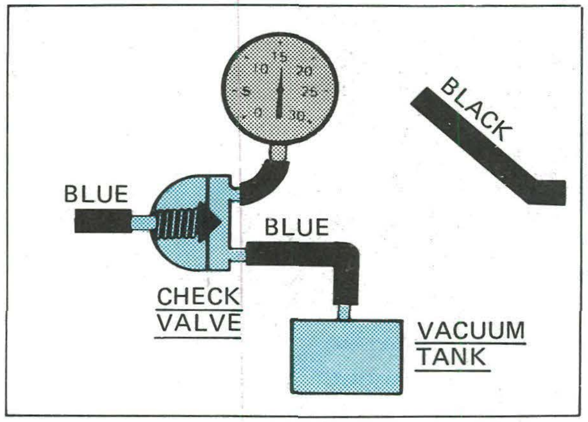


Figure 1 — System Supply Test

1. Connect **Vacuum Tester** to system side of **Check Valve** (Figure 1).
2. Start engine. Gage should show approximately 15" of vacuum.
3. Turn off engine. Watch gage.
   —If vacuum holds, supply OK.
   —If vacuum fails, replace **Check Valve** or **Tank.**

Leak Test

1. Connect **Vacuum Gage** and **Vacuum Pump** (Figure 3) to system hose in place of tank.
2. Open valve and start pump. Operate controls in all modes.
3. Listen for hiss, watch gage.

> NOTE
>
> Hissing is normal at **Function Control** when changing modes.

If system hisses or loses vacuum, find system leak as follows:

1. Turn on **Vacuum Pump** and check for vacuum build-up.
2. Stop pump, vacuum should drop due to leak.
3. Clamp supply hoses with needle-nose pliers one at a time until vacuum stops dropping (Figure 3).
4. Check vacuum schematic to find components in that line.
5. Clamp hoses through circuit to find leak.

Component Test

1. Connect **Vacuum Tester** (Figure 2) to component.
2. Pump **Vacuum Tester** and check that component operates correctly and vacuum holds.
3. Replace component if vacuum doesn't hold.

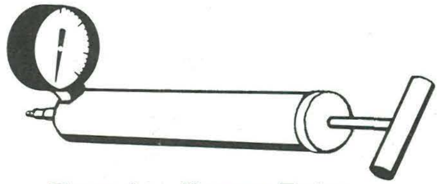


Figure 2 — Vacuum Tester

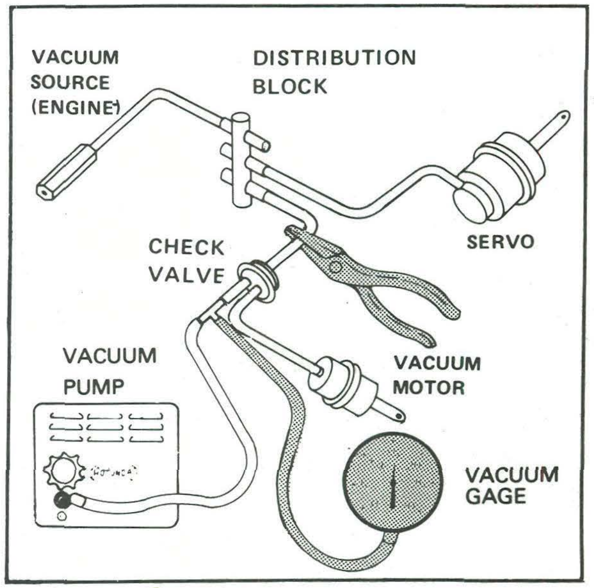
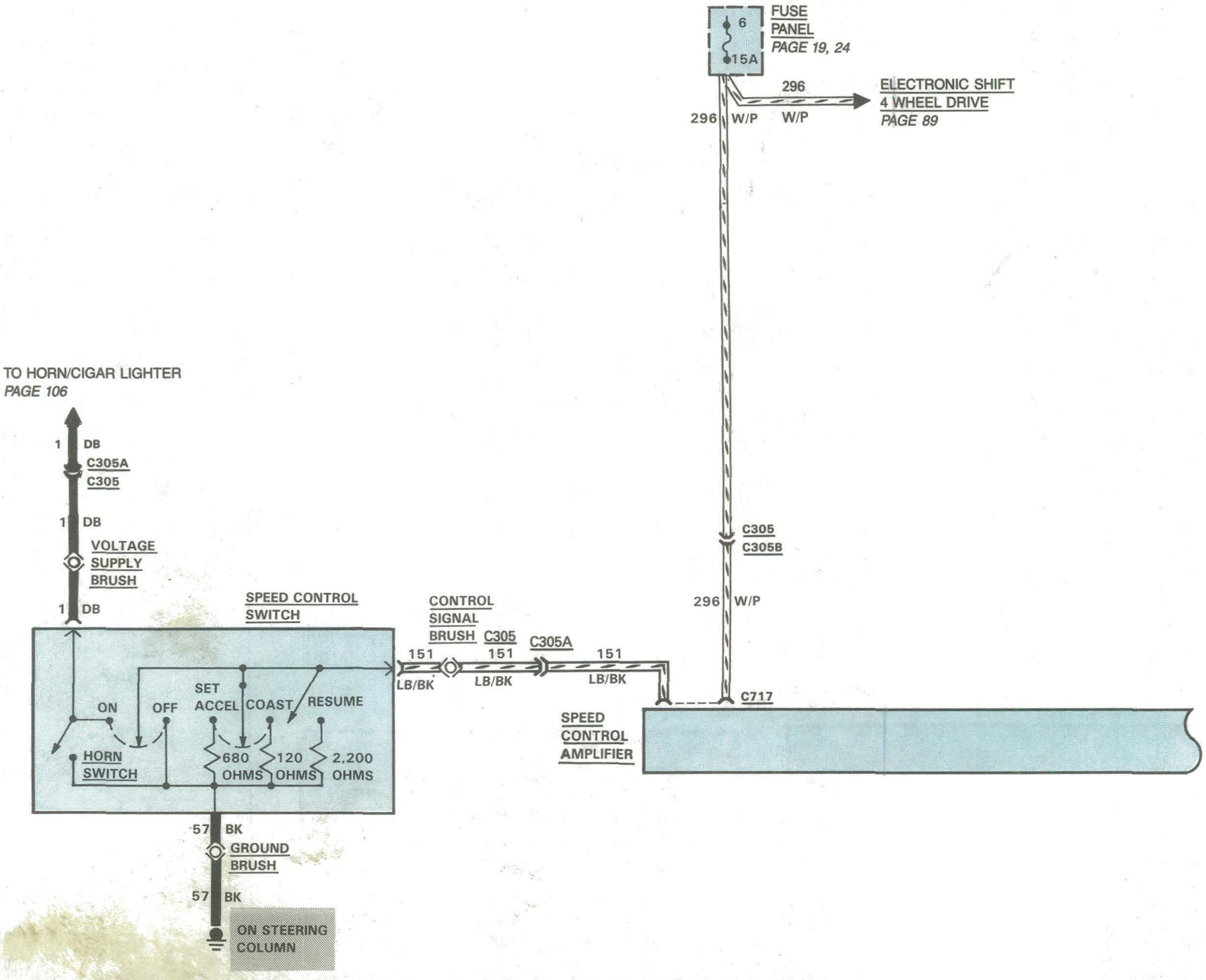
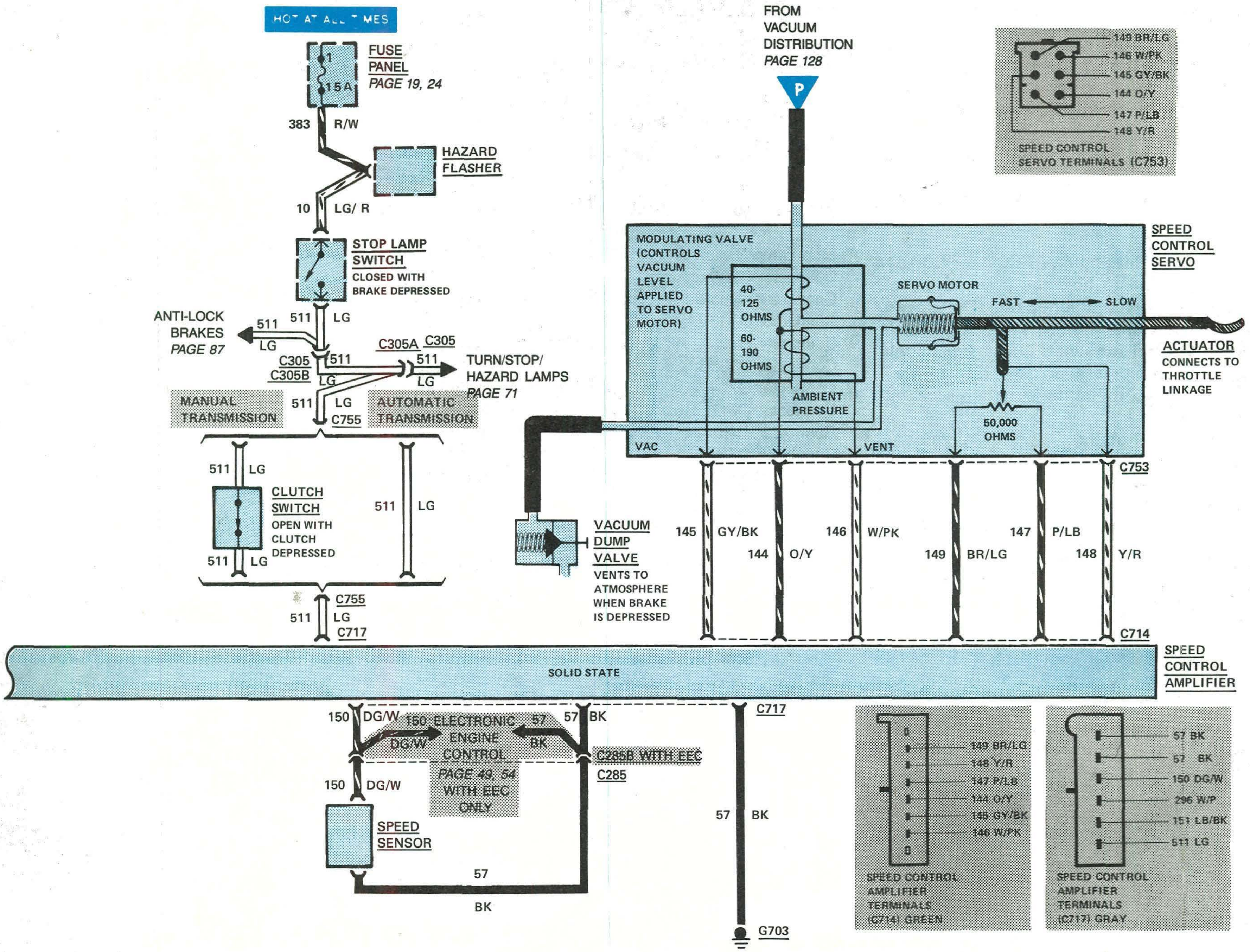


Figure 3 — Testing For Leak In Typical Vacuum System


FUSE PANEL
PAGE 19, 24
6
15A
296
W/P
296 W/P
ELECTRONIC SHIFT 4 WHEEL DRIVE
PAGE 89
TO HORN/CIGAR LIGHTER
PAGE 106
1 DB
C305A
C305
1 DB
VOLTAGE SUPPLY BRUSH
1 DB
SPEED CONTROL SWITCH
ON
OFF
SET ACCEL
COAST
RESUME
HORN SWITCH
680 OHMS
120 OHMS
2,200 OHMS
CONTROL SIGNAL BRUSH
C305
C305A
151
LB/BK
151
LB/BK
151
LB/BK
C305
C305B
296 W/P
C717
SPEED CONTROL AMPLIFIER
57 BK
GROUND BRUSH
57 BK
ON STEERING COLUMN


HOT AT ALL TIMES
FUSE PANEL
PAGE 19, 24
1
15A
383
R/W
HAZARD FLASHER
10
LG/ R
STOP LAMP SWITCH
CLOSED WITH BRAKE DEPRESSED
511
LG
ANTI-LOCK BRAKES
PAGE 87
511
LG
C305A
C305
C305
C305B
511
LG
511
LG
TURN/STOP/ HAZARD LAMPS
PAGE 71
MANUAL TRANSMISSION
511
LG
C755
AUTOMATIC TRANSMISSION
511
LG
CLUTCH SWITCH
OPEN WITH CLUTCH DEPRESSED
511
LG
511
LG
C755
511
LG
C717
FROM VACUUM DISTRIBUTION
PAGE 128
P
MODULATING VALVE (CONTROLS VACUUM LEVEL APPLIED TO SERVO MOTOR)
40-125 OHMS
60-190 OHMS
AMBIENT PRESSURE
SERVO MOTOR
FAST
SLOW
SPEED CONTROL SERVO
ACTUATOR
CONNECTS TO THROTTLE LINKAGE
50,000 OHMS
VAC
VENT
C753
VACUUM DUMP VALVE
VENTS TO ATMOSPHERE WHEN BRAKE IS DEPRESSED
145
GY/BK
144
O/Y
146
W/PK
149
BR/LG
147
P/LB
148
Y/R
C714
SOLID STATE
SPEED CONTROL AMPLIFIER
149 BR/LG
146 W/PK
145 GY/BK
144 O/Y
147 P/LB
148 Y/R
SPEED CONTROL SERVO TERMINALS (C753)
150
DG/W
150
ELECTRONIC ENGINE CONTROL
PAGE 49, 54 WITH EEC ONLY
DG/W
57
BK
57
BK
C285B WITH EEC
C285
C717
150
DG/W
SPEED SENSOR
57
BK
57
BK
G703
149 BR/LG
148 Y/R
147 P/LB
144 O/Y
145 GY/BK
146 W/PK
SPEED CONTROL AMPLIFIER TERMINALS (C714) GREEN
57 BK
57 BK
150 DG/W
296 W/P
151 LB/BK
511 LG
SPEED CONTROL AMPLIFIER TERMINALS (C717) GRAY

HOW THE CIRCUIT WORKS

The **Speed Control Amplifier** controls vacuum to the **Speed Control Servo** motor through the modulating valve. The servo motor moves the throttle through the **Actuator** (cable or bead chain).

To operate the **Speed Control System,** the engine must be running and the car speed faster than 30 mph. The system is turned on by pressing the ON switch of the **Speed Control Switch.**

Pressing and releasing SET/ACCEL or COAST sends a command to hold the present speed. This speed is now the *set speed.* The **Speed Sensor** (in the transmission) sends signals to the **Speed Control Amplifier.** These signals tell the amplifier to increase or decrease the vacuum at the servo motor to keep the truck at the *set speed.*

Pressing and holding SET/ACCEL speeds the truck up. The truck speed increases as long as SET/ACCEL is depressed. Releasing SET/ACCEL gives the system a new *set speed* to maintain. Truck speed may also be increased by depressing the accelerator until the higher speed is reached, then pressing and releasing SET/ACCEL.

Pressing and holding COAST slows the truck down. The truck speed decreases as long as COAST is depressed. Releasing COAST gives the system a new *set speed* to maintain.

Pressing OFF turns the system off (grounds **LB/BK** wire). The system is also turned off when the brake pedal is depressed (power through **LG/R** wire) or the **Ignition Switch** is turned OFF.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Hazard Flasher	On back of fuse panel			
Clutch Switch	Attached to bracket at top of clutch pedal			
Horn Switch	Mounted in steering wheel hub assembly			
Speed Control Amplifier	Behind I/P at RH side of steering column	107-2		
Speed Control Servo	On LH inner fender next to master brake cylinder			
Speed Control Switch	Mounted in steering wheel hub assembly			
Speed Sensor	Below lower LH side of master brake cylinder			
Stop Lamp Switch	Mounted to bracket at top of brake pedal			
Connector C285	At speed sensor			4
Connector C285B	At speed sensor			4
Connector C305	LH side of steering column		GY	11
Connector C305A	LH side of steering column		GY	11
Connector C305B	LH side of steering column		GY	11
Connector C714	At speed control amplifier		GR	8
Connector C717	At speed control amplifier		GY	6
Connector C753	At speed control servo		BR	6
Connector C755	At clutch switch		GR	2
Ground G703	At brace under steering column			

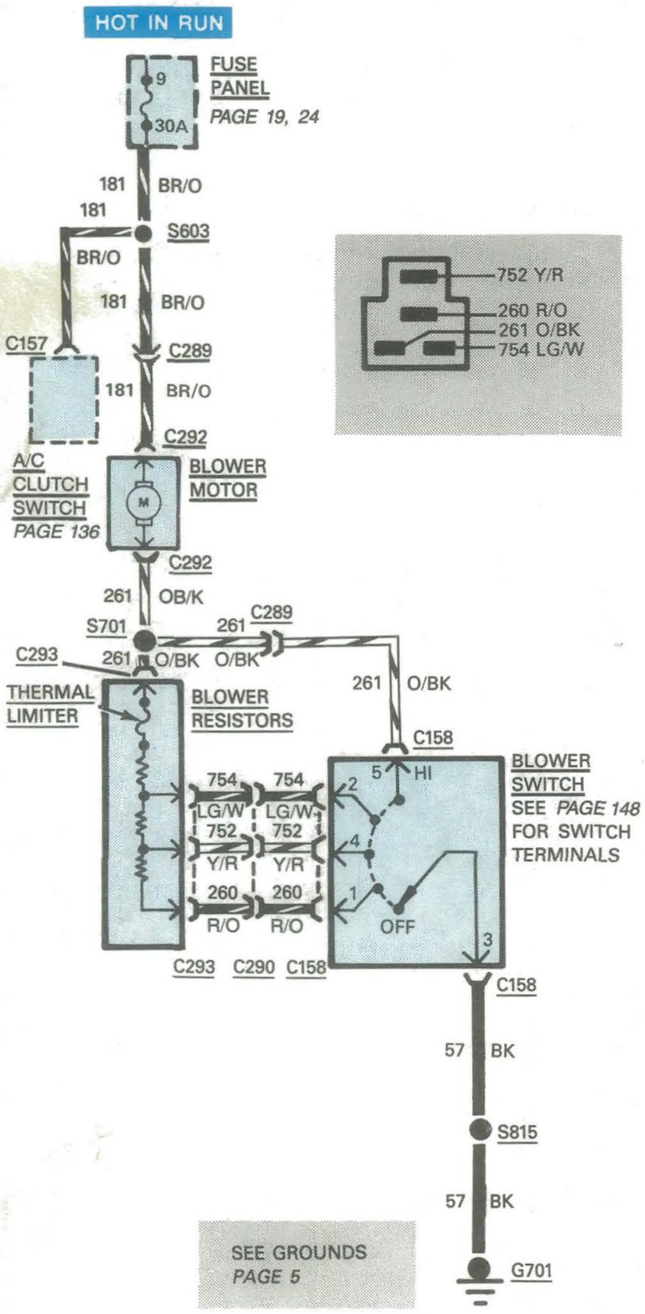
The **Vacuum Dump Valve** also operates when the brake pedal is depressed. This is a backup device to turn off the system. In trucks with manual transmission, the **Clutch Switch** opens when the clutch pedal is depressed and turns off the system.

When the system has been deactivated by depressing the brake or clutch pedal, the last *set speed* may be resumed by pressing RESUME. This feature will not work if OFF has been depressed or if truck speed is below 30 mph.

TROUBLESHOOTING HINTS

SPEED CONTROL DOES NOT OPERATE

- Inspect system for broken wires or damaged hoses. Be sure **Speed Control Servo** and throttle linkage operate freely without binding. The **Actuator** cable must have no more than 1/8 inch free play.
- Disconnect **C717** at **Speed Control Amplifier.** Check for battery voltage on **W/P** wire. Check for ground on **BK** wire.
- Read "Speed Control Circuit Diagnosis" in Section 37 of Shop Manual. Refer to Video Course No. 3701-007.
- Check for battery voltage, when ON is pressed.
- **Connect an ohmmeter between the LB/BK wire and ground. Rotate the steering wheel through its full range, and perform the following checks:**
  Depress OFF read 0 to 1 ohm,
  Depress SET/ACCEL; read 646 to 714 ohms.
  Depress COAST; read 114 to 126 ohms.
  Depress RESUME; read 2090 to 2310 ohms.
- Check operation of **Vacuum Dump Valve** and **Clutch Switch.**
- Check steering wheel brushes for continuity of 1 ohm or less.



COMPONENT LOCATION

		Page-Figure	Color	Terminals
Blower Motor	Mounted to plenum at RH side of dash panel			
Blower Resistors	Mounted to plenum next to blower motor	139-2		
Blower Switch	At center of I/P			
Connector C158	At blower switch		GY	5
Connector C289	RH cowl		BK	4
Connector C290	RH cowl		GY	4
Connector C292	At blower motor			2
Connector C293	At blower resistor		W	4
Ground G701	Behind I/P near center			
Splice S162	Near heater control switch T/O			
Splice S603	In T/O to blower motor switch			
Splice S701	Near blower resistor T/O			
Splice S805	Near cigar lighter T/O			

HOW THE CIRCUIT WORKS

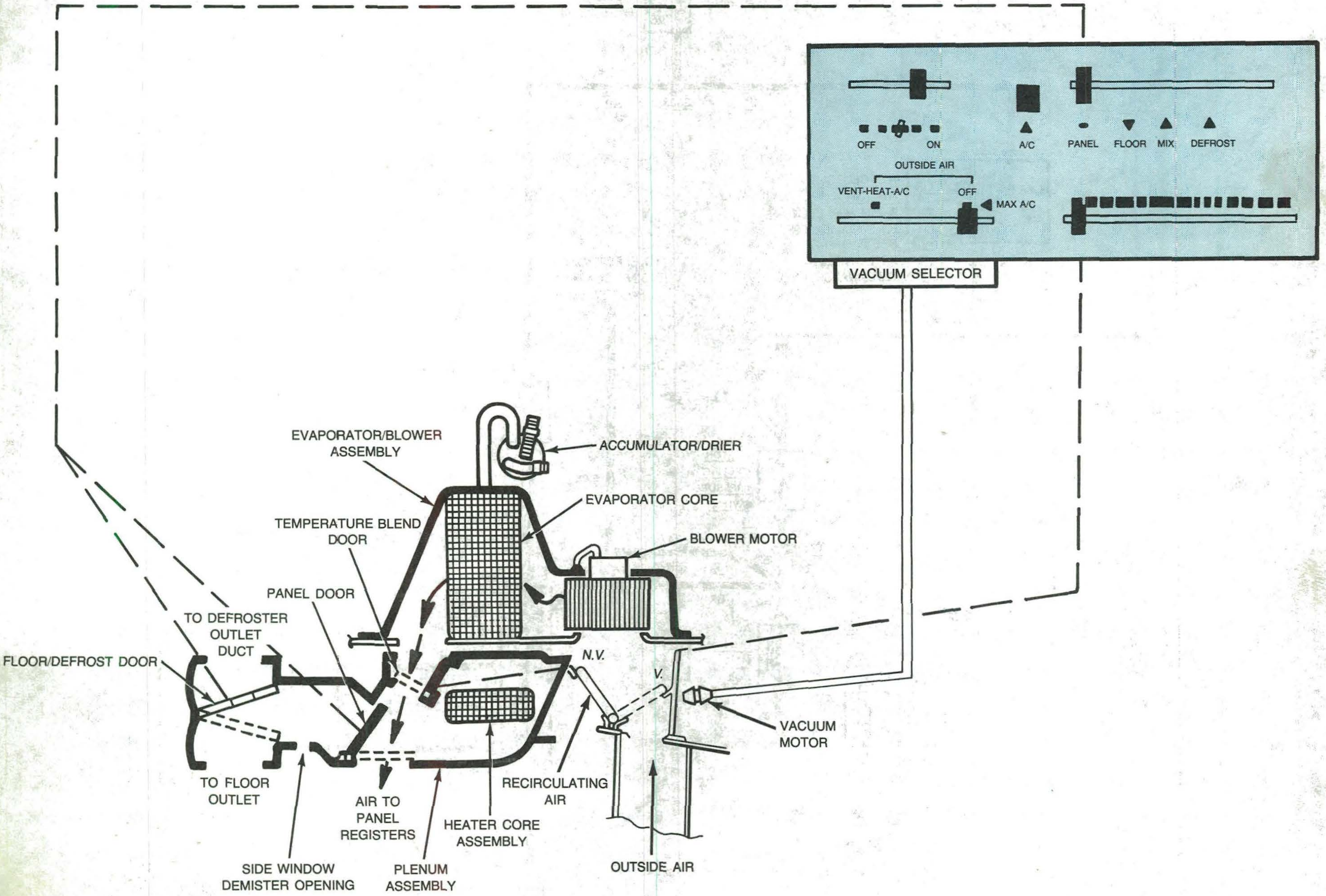
With the **Ignition Switch** in RUN and the **Blower Switch** in LO, MED 1, MED 2, or HI, current can flow through **Fuse 9**, the **Blower Motor**, the **Blower Resistors**, and the **Blower Switch** to **G701**.

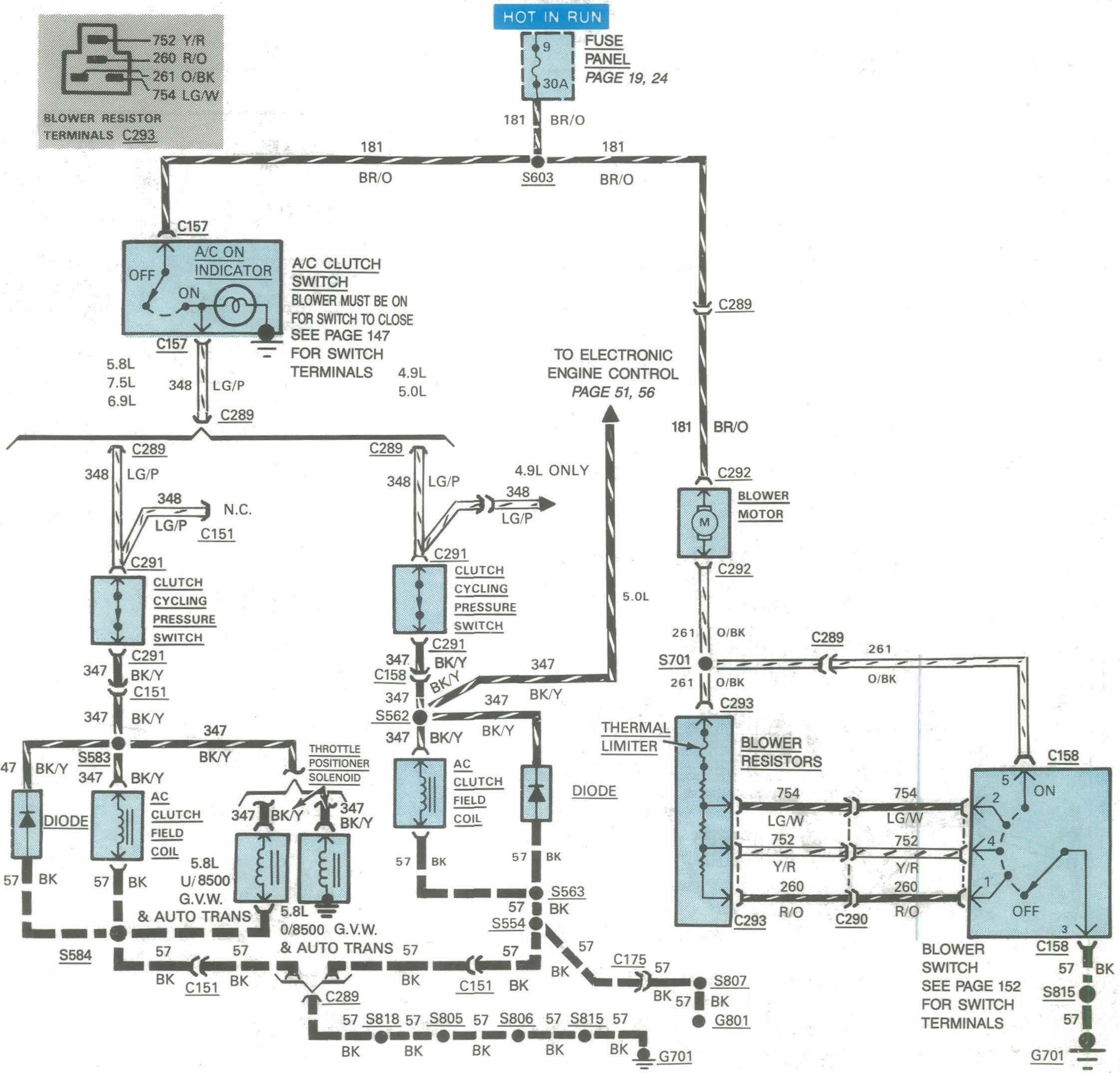
In LO, MED 1, or MED 2, current flows through one, two or all **Blower Resistors**. In HI, current flows directly from the **Blower Motor** through the switch to ground.

TROUBLESHOOTING HINTS

BLOWER DOESN'T WORK

- Check **Fuse 9**. Make sure **G701** is clean and tight.
- Separate the O/BK wire at the **Blower Motor**. Check for continuity to ground (less than 3 ohms). If bad, check continuity of **Blower Motor**, **Blower Resistors**, and **Blower Switch**.
- Check **Blower Switch** for continuity, between pin 3 and pins 1, 2, 4 and 5.
- Check all connectors for corrosion.


OFF
ON
A/C
PANEL
FLOOR
MIX
DEFROST
OUTSIDE AIR
VENT-HEAT-A/C
OFF
MAX A/C
VACUUM SELECTOR
EVAPORATOR/BLOWER ASSEMBLY
ACCUMULATOR/DRIER
EVAPORATOR CORE
TEMPERATURE BLEND DOOR
BLOWER MOTOR
PANEL DOOR
TO DEFROSTER OUTLET DUCT
FLOOR/DEFROST DOOR
N.V.
V.
VACUUM MOTOR
TO FLOOR OUTLET
AIR TO PANEL REGISTERS
RECIRCULATING AIR
HEATER CORE ASSEMBLY
SIDE WINDOW DEMISTER OPENING
PLENUM ASSEMBLY
OUTSIDE AIR


752 Y/R
260 R/O
261 O/BK
754 LG/W
BLOWER RESISTOR TERMINALS C293
HOT IN RUN
9
30A
FUSE PANEL
PAGE 19, 24
181 BR/O
181
BR/O
S603
181
BR/O
C157
A/C ON INDICATOR
OFF
ON
A/C CLUTCH SWITCH
BLOWER MUST BE ON FOR SWITCH TO CLOSE
SEE PAGE 147 FOR SWITCH TERMINALS
C157
5.8L
7.5L
6.9L
348 LG/P
C289
4.9L
5.0L
C289
TO ELECTRONIC ENGINE CONTROL
PAGE 51, 56
181 BR/O
C289
348 LG/P
348
LG/P
N.C.
C151
C291
CLUTCH CYCLING PRESSURE SWITCH
C291
347 BK/Y
C151
347 BK/Y
347
BK/Y
S583
347 BK/Y
347 BK/Y
DIODE
AC CLUTCH FIELD COIL
THROTTLE POSITIONER SOLENOID
347 BK/Y
347 BK/Y
57 BK
57 BK
5.8L
U/8500
G.V.W.
& AUTO TRANS
5.8L
0/8500 G.V.W.
& AUTO TRANS
S584
57
BK
C151
57
BK
C289
C289
348 LG/P
4.9L ONLY
348
LG/P
C291
CLUTCH CYCLING PRESSURE SWITCH
C291
347 BK/Y
C158
BK/Y
347
347
BK/Y
5.0L
S562
347
BK/Y
347 BK/Y
BK/Y
AC CLUTCH FIELD COIL
DIODE
57 BK
57 BK
S563
57 BK
S554
57
BK
57
BK
C151
BK
57
C175
57
BK
S807
57 BK
G801
C289
57 S818 57 S805 57 S806 57 S815 57
BK BK BK BK BK
G701
C292
BLOWER MOTOR
M
C292
261 O/BK
C289
261
O/BK
S701
261 O/BK
C293
THERMAL LIMITER
BLOWER RESISTORS
754
LG/W
752
Y/R
260
R/O
754
LG/W
752
Y/R
260
R/O
C293
C290
C158
5
ON
2
4
1
OFF
3
C158
BLOWER SWITCH
SEE PAGE 152 FOR SWITCH TERMINALS
57 BK
S815
57
G701

HOW THE CIRCUIT WORKS

Blower

The **Blower** circuit is used in both the Heater and A/C-Heater systems.

With the Ignition Switch in RUN, voltage is applied to the **Blower Motor**. With the **Blower Switch** in HI position, ground is connected to the motor for full speed operation. In OFF there is no ground connection to the motor. In the intermediate positions, one, two, or three resistors and a thermal limiter are connected between the motor and ground to control current and motor speed.

Control Assembly

The Heater Control assembly contains the **Blower Switch** and three control levers. The four-position Function Selector Lever (labeled **Panel, Hi-Lo, Floor and Defrost**) controls output air to the floor, instrument panel, and defrost outlets. The outside door lever, labled Vent-Heat and Off, opens (**Vent-Heat**) and closes the system to outside air.

The temperature control lever moves a control cable connected to the temperature blend air door which directs air flow through and/or around the heater core.

A/C-Heater

The A/C-Heater system contains a control assembly (on the instrument panel), an evaporator blower housing assembly, a plenum assembly and air distribution ducts, and a condenser and compressor (in the engine compartment).

The A/C Heater Control assembly contains the **Blower Switch** and the pushbutton **A/C Clutch Switch**. The **A/C Clutch Switch** applies voltage to the **A/C Clutch Field Coil** circuit which allows the engine to drive the compressor when the pressure switch is closed. The **Vacuum Control Solenoid** increases idle speed when the **A/C Clutch Field Coil** is energized. The **Clutch Cycling Pressure Switch** cuts off power to the **A/C Clutch Field Coil** with low suction pressure to prevent evaporator freeze-up.

Other controls on the A/C Heater control assembly move cables which adjust doors in the air system. The four-position function selector lever (labeled **Panel, Hi-Lo, Floor, and Defrost**) controls output air to the floor, instrument panel, and defrost outlets.

The air door lever, labeled **Vent, Heat, A/C, Max A/C,** selects inlet air from outside the car (**Vent, Heat, A/C**), or recirculated in-car air (**Max A/C**).

The temperature control lever moves a control cable connected to the temperature blend air door which directs air through and/or around the heater core to obtain the desired discharge air temperature.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
A/C Clutch Switch	In center of I/P			
A/C Clutch Field Coil	Part of Compressor	139-3		
Blower Motor	Mounted to plenum at RH side of dash panel			
Blower Switch	At center of I/P			
Blower Resistors	Mounted to plenum next to blower	139-2		
Clutch Cycling Pressure Switch	RH side of dash panel on accumulator		GY	1
Connector C151	Engine compartment		BK	2
Connector C157	At A/C clutch switch		W	2
Connector C175	Engine compartment LH			10
Connector C289	RH cowl		BK	4
Connector C292	At blower motor			2
Ground G701	Behind I/P near center			
Ground G801	LH inner fender behind headlamp			
Splice S554	Near speed sensor T/O			
Splice S562	Near A/C clutch T/O			
Splice S563	Near A/C clutch T/O			
Splice S603	Near A/C clutch switch T/O			
Splice S701	Near blower resistor T/O			
Splice S805	Near cigar lighter T/O			
Splice S567	Near T/O to A/C pressure cycling switch			
Splice S583	Near T/O to A/C clutch coil			
Splice S584	Near T/O to A/C clutch coil			
Splice S806	Near T/O to windshield wiper switch			
Splice S807	Near T/O to main light switch			
Splice S815	Near T/O to G701			
Splice S818	Near T/O to RH I/P courtesy lamp			

TROUBLESHOOTING HINTS

BLOWER DOESN'T WORK

- Check **Fuse 9.** Make sure **G701** is clean and tight.
- Separate the **O/BK** wire at the **Blower Motor.** Check for continuity to ground (less than 3 ohms). If bad, check continuity of **Blower Motor, Blower Resistors,** and **Blower Switch.**
- **Check Blower Switch** for continuity, between pin 3 and pins 1, 2, 4 and 5.
- Check all connectors for corrosion.

COMPRESSOR CLUTCH DOESN'T WORK

- With **Ignition Switch** in RUN and **A/C Clutch Switch** in A/C ON, check for voltage at **A/C Clutch Field Coil.** Check Fuse 9.
- Remove connector at **A/C Clutch Field Coil.** Check for continuity through clutch field coil. Check continuity to ground at **57 BK** wire.
- Separate connector at **Clutch Cycling Pressure Switch.** Check continuity through switch. No continuity may indicate system is low or out of R-12 refrigerant.
- Check circuit continuities. Check all connectors for corrosion.

HISSING: NO RECIRCULATING AIR

- Refer to Vacuum Schematic. Check for vacuum system leak or bad motor. Read "How to Find the Vacuum Problem" on page 93.
- If vacuum is lost when engine stops, perform Vacuum Supply Test.
- See "Vacuum Leak Diagnosis" in the Shop Manual.

NO COOLING OR NOT ENOUGH COOLING

- Check A/C compressor drive belt tension.
- Be sure door vacuum motors don't stick.
- Check temperature control cable for proper adjustment.
- See Section 36 of Shop Manual for Refrigerant System diagnosis.

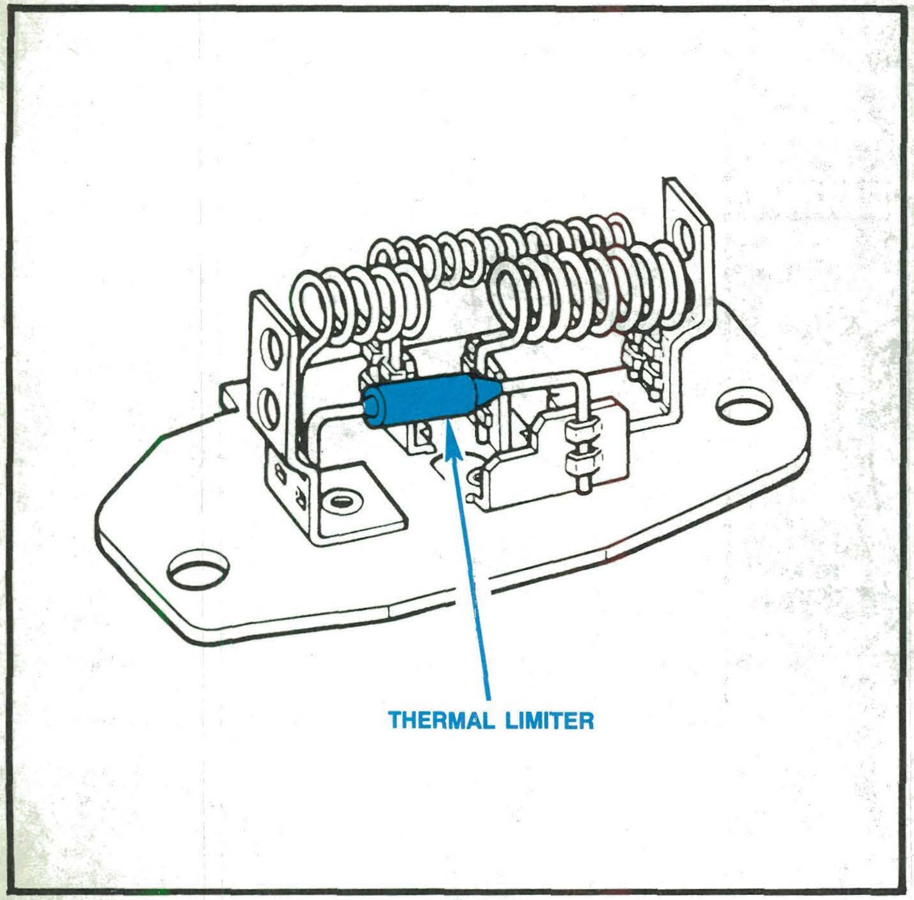


Figure 1 — Blower Resistor Assembly

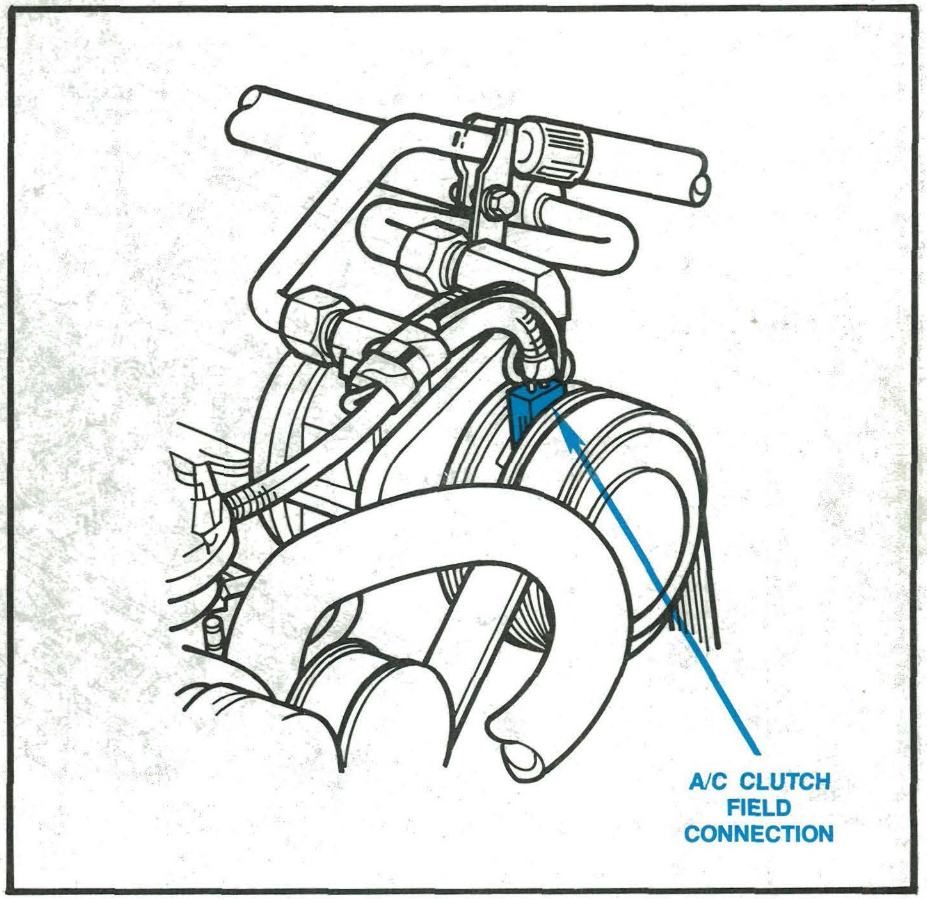


Figure 2 — Air Conditioning Compressor Field Coil

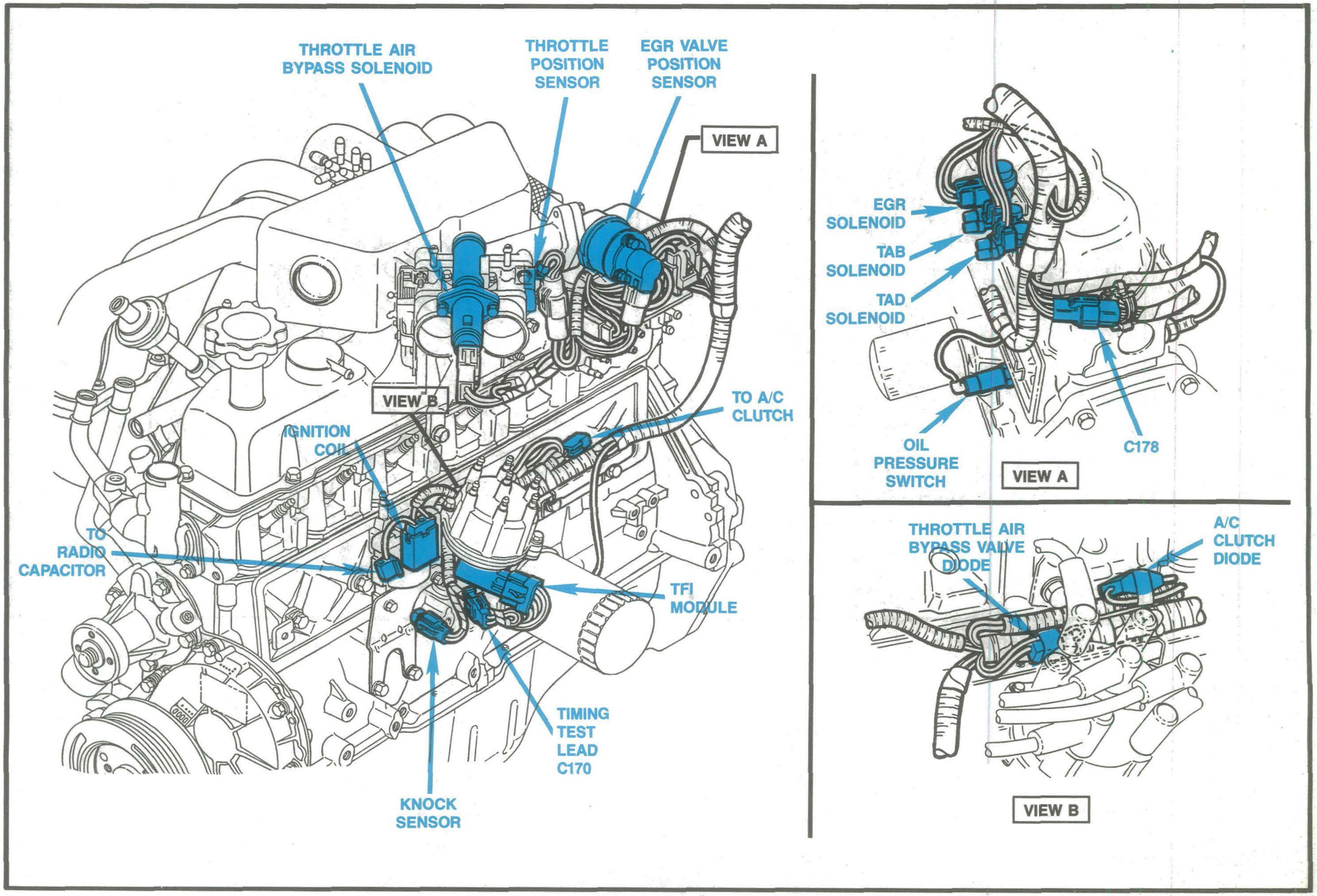


Figure 1 — LH Engine View 4.9L EFI

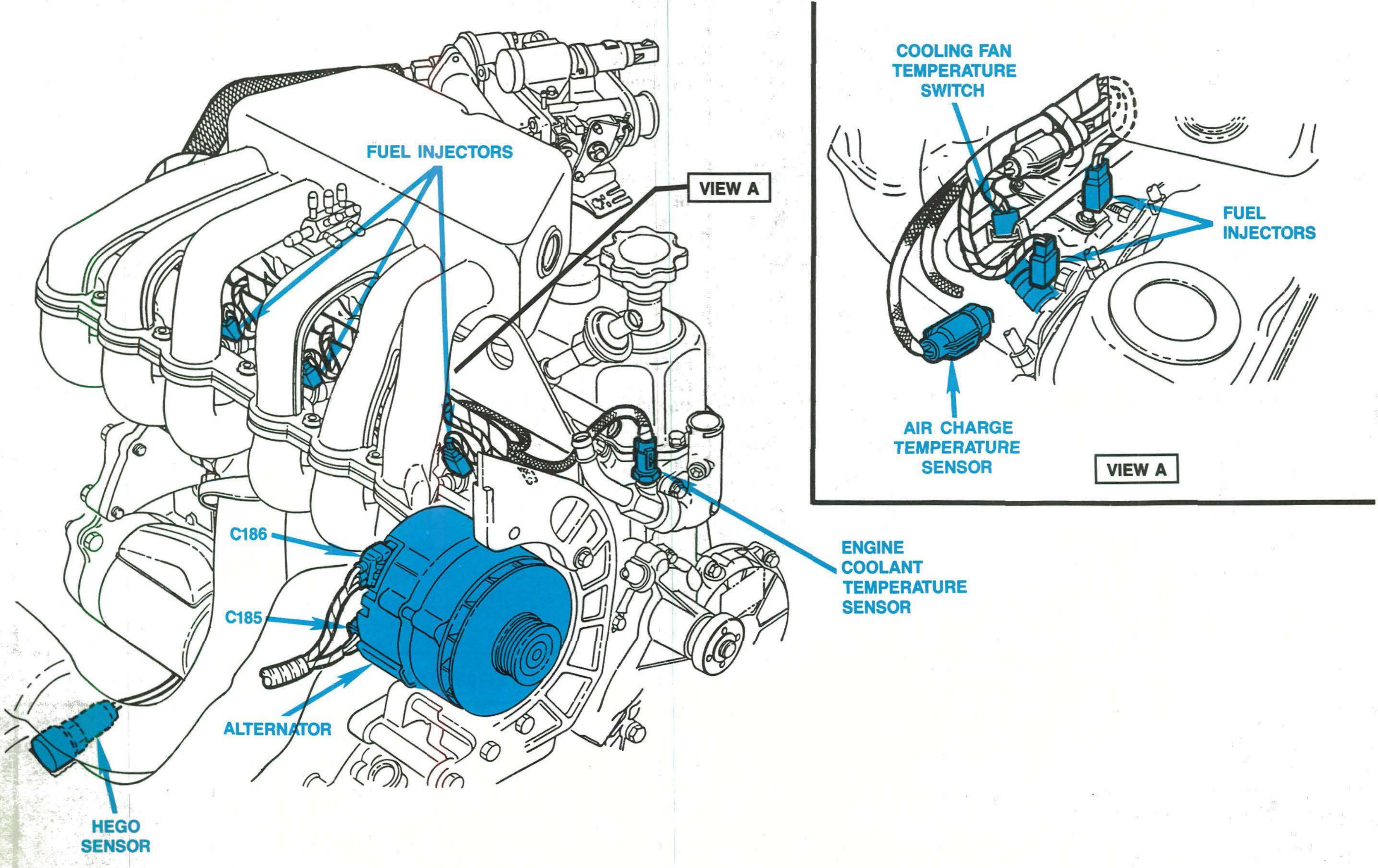

FUEL INJECTORS
VIEW A
C186
C185
ALTERNATOR
HEGO SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
COOLING FAN TEMPERATURE SWITCH
FUEL INJECTORS
AIR CHARGE TEMPERATURE SENSOR
VIEW A

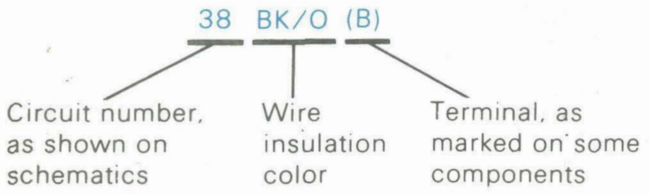
Figure 2 — RH Engine View — 4.9L EFI

INTRODUCTION

Component testing procedures are provided to prove that a component is good or bad.

Testing information for each component includes a schematic, component terminal locations and step-by-step test procedures. Component terminals are identified:

1) by the circuit number of the wires that connect to that terminal;
2) by the wire insulation color;
3) by letters or numbers which may be marked on the component.

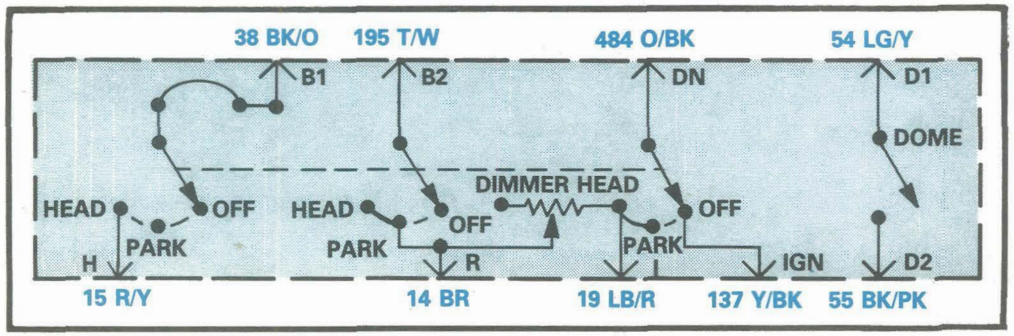

38 BK/O (B)
Circuit number, as shown on schematics
Wire insulation color
Terminal, as marked on some components

The component connector MUST BE REMOVED before testing. To test a single circuit within the component, select that circuit under the column TO TEST. If you wish to test the complete component, perform all tests.

Connect the tester to the terminals shown in the second column and operate the component as shown in the third column.

MAIN LIGHT SWITCH

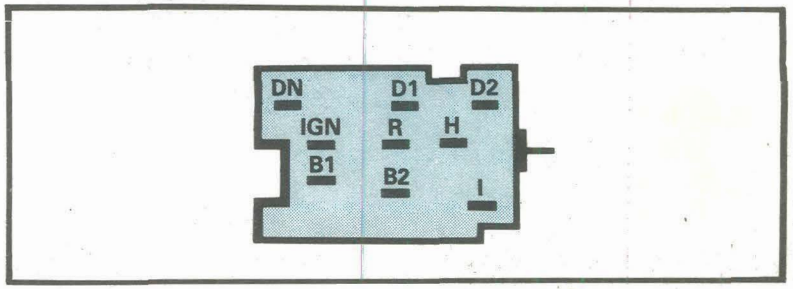
SCHEMATIC



COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Lamp or Ohmmeter to Terminals	Move Knob to These Positions	A Good Switch Will Indicate
Headlamp Circuit	38 BK/O (B) *and* 15 R/Y (H)	**Off** **Park** **Head**	Open Circuit Open Circuit Closed Circuit
Park Lamp Circuit	195 T/W (A) *and* 14 BR (R)	**Off** **Park** **Head**	Open Circuit Closed Circuit Closed Circuit
Dome Light Circuit	54 LG/Y (D1) *and* 55 BK/PK (D2)	Fully Counter-Clockwise (In Detent) Clockwise (Any Amount Out of Detent)	Closed Circuit Open Circuit
Panel Light Dimmer Circuit	14 BR (R) *and* 19 LB/R (I)	Rotate Knob Clockwise	Ohmmeter Will Show Smoothly Increasing Resistance
Ignition On, Lamps Off Circuit	137 Y/BK (IGN) *and* 484 O/BK (DN)	Off Park Head	Closed Circuit Open Circuit Open Circuit
Cluster Dimmer Circuit	19 LB/R (I) and 484 O/BK (DN)	Off Park Head	Open Circuit Closed Circuit Closed Circuit

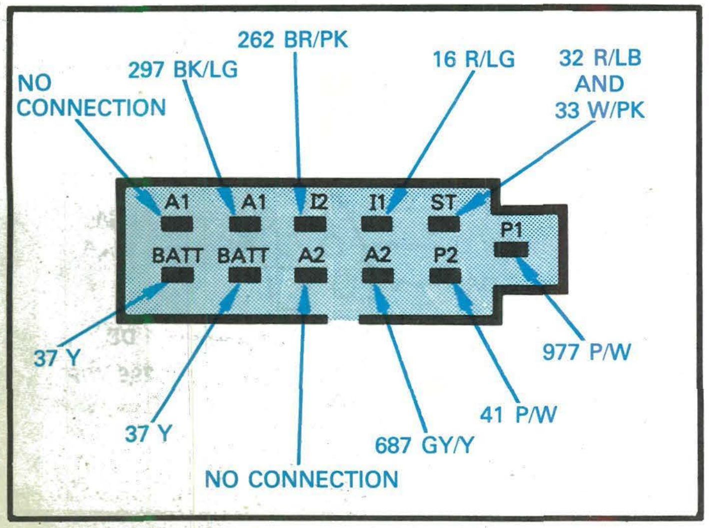
TERMINAL LOCATIONS ON SWITCH



COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Key to These Positions	A Good Switch Will Indicate
Internal Switch Connections **(perform these tests first)**	37 Y (BATT) *and* 37 Y (BATT)	Accy, Lock, Off, Run, Start	Closed Circuit in all five positions
	687 GY/Y (A2) *and* 687 GY/Y (A2)	Accy, Lock, Off, Run, Start	Closed Circuit in all five positions
Starter Relay Circuit	37 Y (BATT) (either terminal) *and* 32 R/L B (ST)	Accy, Lock, Off, Run, Start	Closed Circuit in **Start** position only
A/C, Heater Circuit, Turn/ Stop Lamps, Backup Lamps	37 Y (BATT) (either terminal) *and* 687 GY/Y (A2) (either terminal)	Accy, Lock, Off, Run, Start	Closed Circuit in **Run** position only

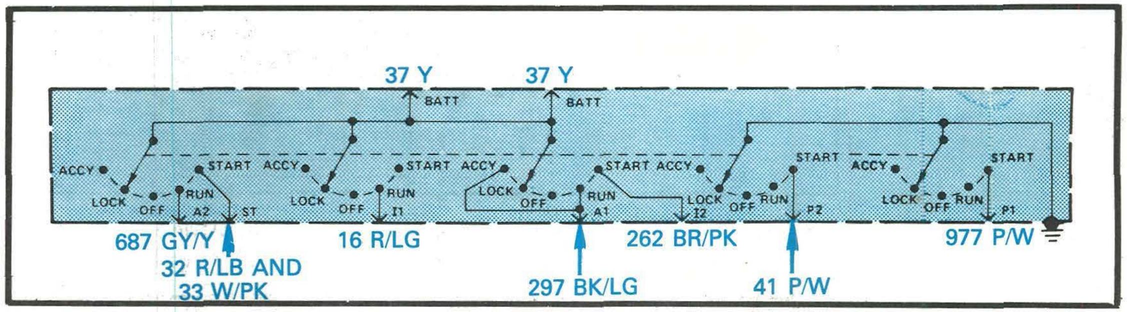
TERMINAL LOCATIONS



COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Key to These Positions	A Good Switch Will Indicate
Ignition Circuit	37 Y (BATT) (either terminal) *and* 16 R/LG 5.8L, 7.5L Duraspark Ignition only	Accy, Lock, Off, Run, Start	Closed Circuit in **Run.** May be open or closed in **Start** position.
	37 Y (BATT) (either terminal) *and* 16 R/LG and 262 BR/PK (I2)	Accy, Lock, Off, Run, Start	Closed Circuit in **Start** position only
"Accy" Circuit	37 Y (BATT) (either terminal) *and* 297 BK/LG (A1)	Accy, Lock, Off, Run, Start	Closed Circuit in **Run** and **Accy** position only
Bulb-Test Circuit	41 BK/LB or 977 P/W (P1) *and* Ignition Switch Case	Accy, Lock, Off, Run, Start	Closed Circuit in **Start** position only
	977 P/W (P2) *and* Ignition Switch Case	Accy, Lock, Off, Run, Start	Closed Circuit in **Start** position only

SCHEMATIC



COMPONENT TESTING: TURN/HAZARD SWITCH

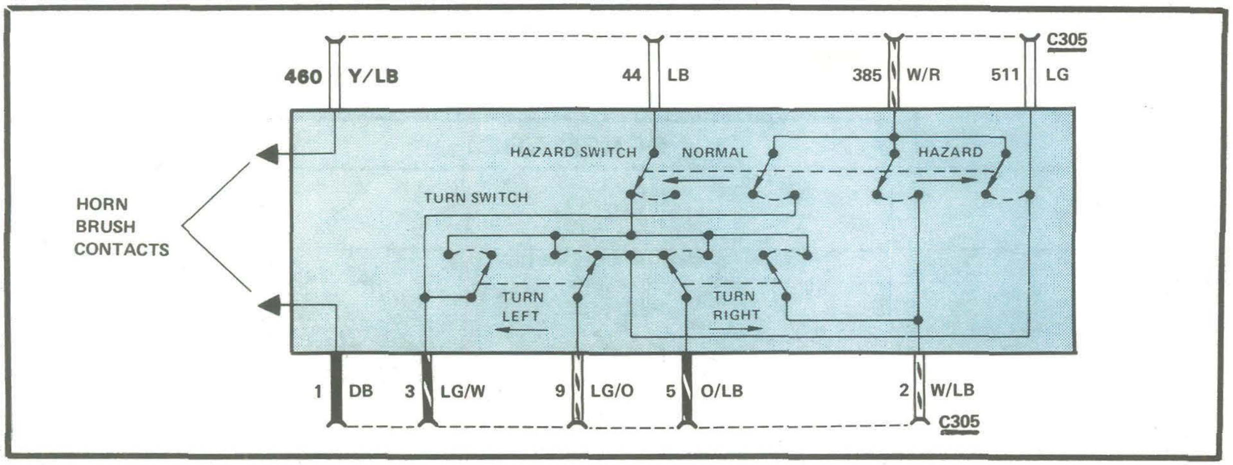
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Horn Switch Circuit	460 Y/LB *and* 1 DB	Depress **Horn Switch** (If removed from truck, jumper brush contacts)	Closed Circuit
LH Rear Turn Circuit	44 LB *and* 9 LG/O	**Turn Switch** to **Turn Left** and **Hazard Switch** to **Normal**	Closed Circuit
LH Front Turn Circuit	44 LB *and* 3 LG/W	**Turn Left**	Closed Circuit
RH Rear Turn Circuit	44 LB *and* 5 O/LB	**Turn Right**	Closed Circuit
RH Front Turn Circuit	44 LB *and* 2 W/LB	**Turn Right**	Closed Circuit

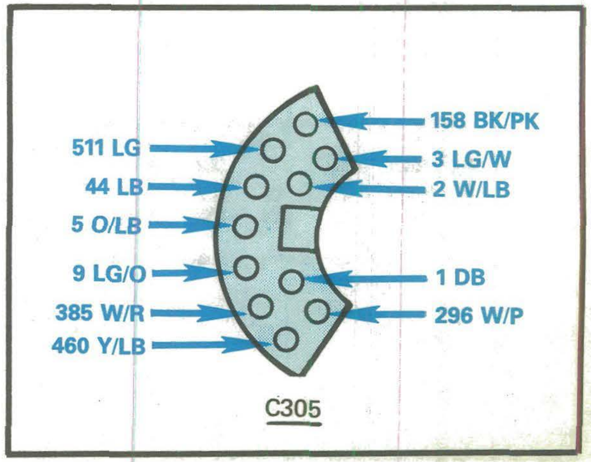
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self-Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Hazard Switch Circuit	385 W/R *and* 511 LG	**Hazard**	Closed Circuit
	385 W/R *and* 2 W/LB	**Hazard**	Closed Circuit
	385 W/R *and* 3 LG/W	**Hazard**	Closed Circuit
Stop Lamp Feed-Through Circuit	511 LG *and* 9 LG/O	**Turn Switch** to center (**No Turn**) position or **Turn Right**	Closed Circuit
	511 LG *and* 5 O/LB	**Turn Switch** to center (**No Turn**) position or **Turn Left**	Closed Circuit

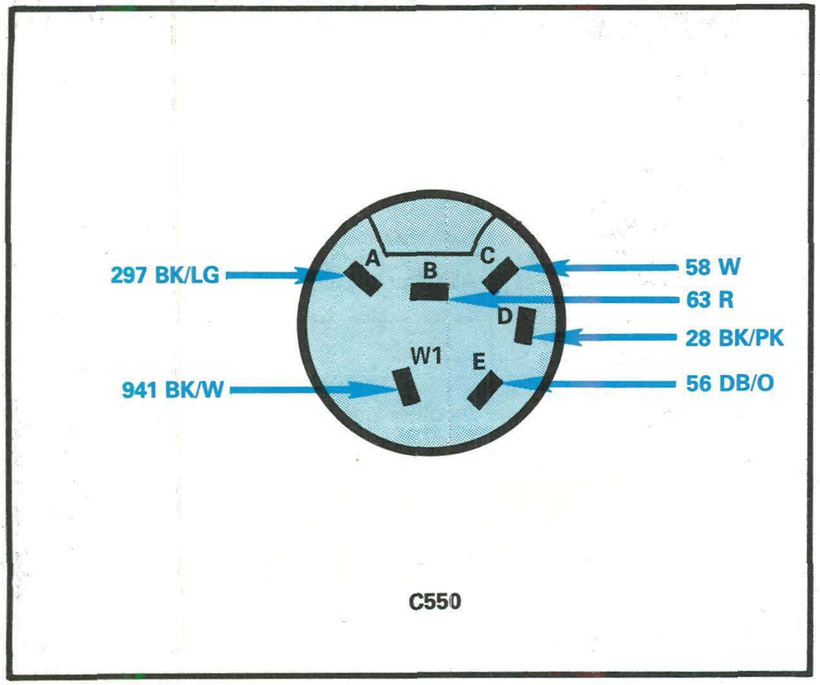
SCHEMATIC



TERMINAL LOCATIONS



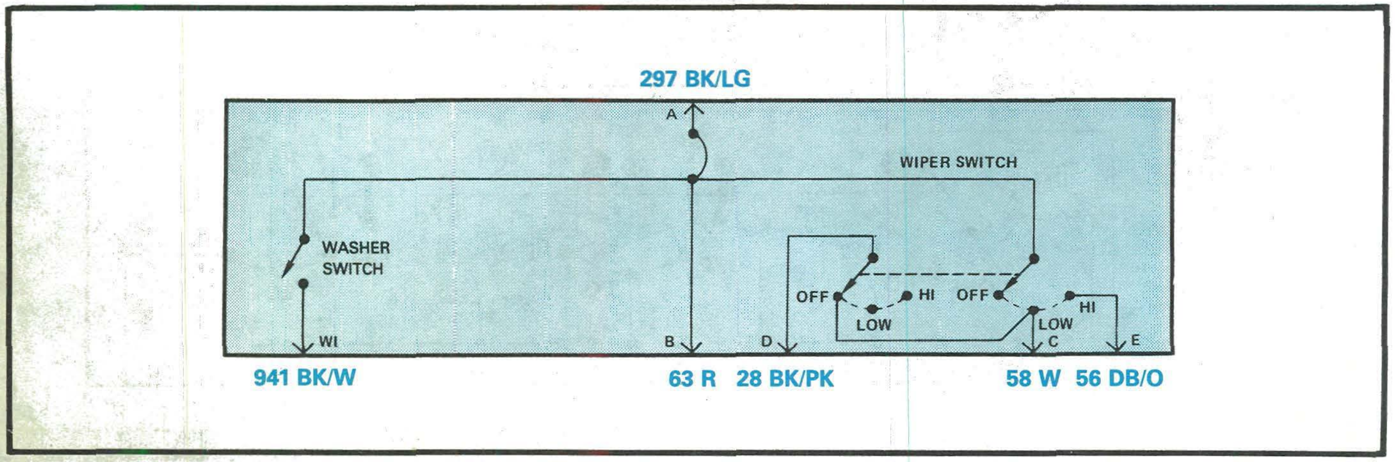
TERMINAL LOCATIONS ON SWITCH



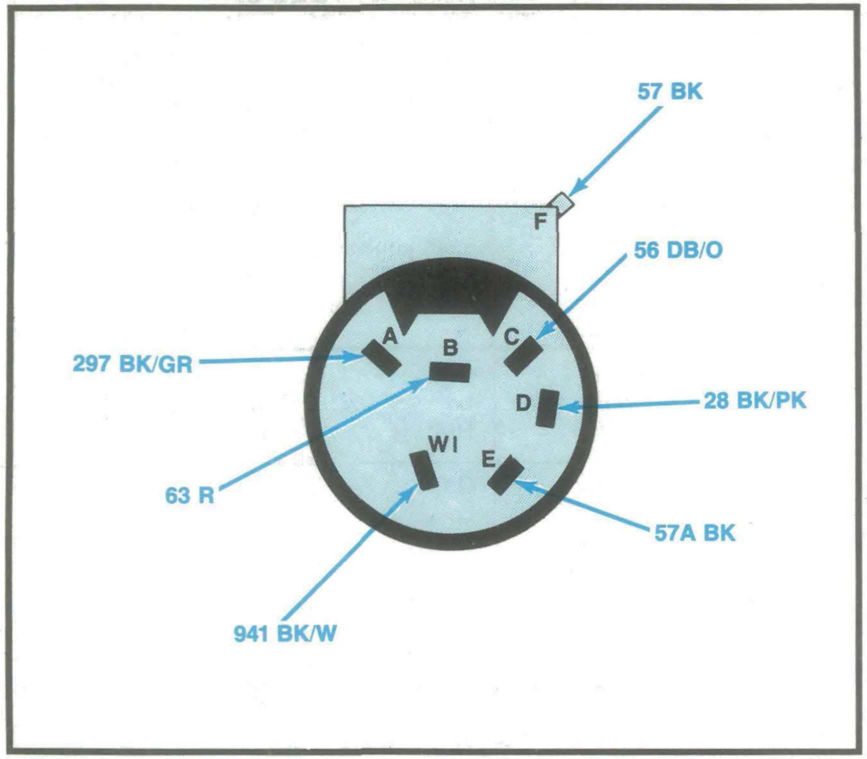
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self-Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Washer Switch Circuit	941 BK/W (W1) *and* 63 R (B)	Push knob Release knob	Closed Circuit Open Circuit
Wiper Switch Circuit	63 R (B) *and* 58 W (C)	Off Lo Hi	Open Circuit Closed Circuit Open Circuit
	63 R (B) *and* 56 DB/O (E)	Off Lo Hi	Open Circuit Open Circuit Closed Circuit
	58 W (C) *and* 28 BK/PK (D)	Off Lo Hi	Closed Circuit Open Circuit Open Circuit
Circuit Breaker	297 BK/LG (A) *and* 63 R (B)	All positions	Closed Circuit

SCHEMATIC



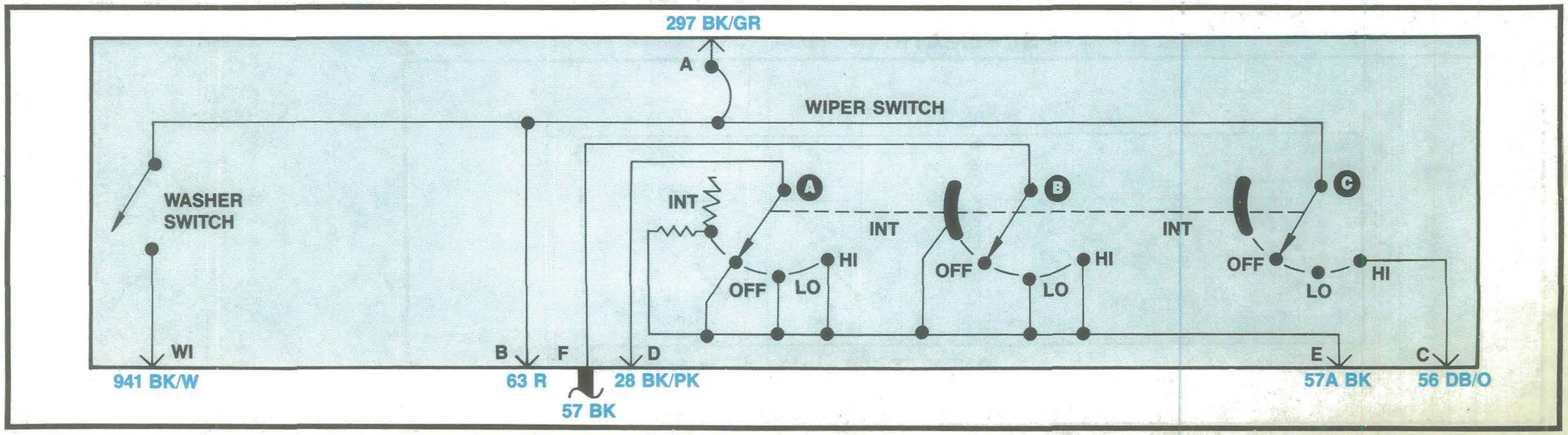
TERMINAL LOCATIONS ON SWITCH



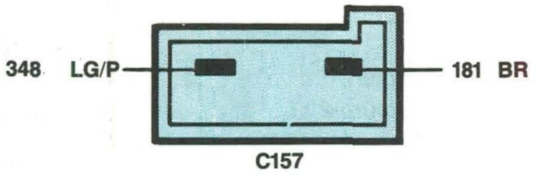
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self-Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Wiper Switch Circuit	57 BK (F) *and* 57A BK (E)	Off	Open Circuit
		All other positions	Closed Circuit
	63 R (B) *and* 56 DB/O (C)	Hi	Closed Circuit
		All other positions	Open Circuit
	28 BK/PK (D) *and* 57 BK (F)	Off	Open Circuit
		Rotate Control .... Clockwise Into Position (as Viewed from Connector Side).	Ohmmeter will indicate smoothly increasing resistance from 200-1000 ohms minimum to 5600-8400 ohms maximum
		All other positions	Closed Circuit

SCHEMATIC



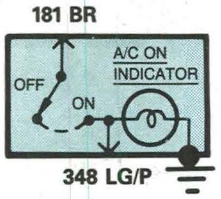
TERMINAL LOCATIONS ON SWITCH



COMPONENT TESTING PROCEDURE

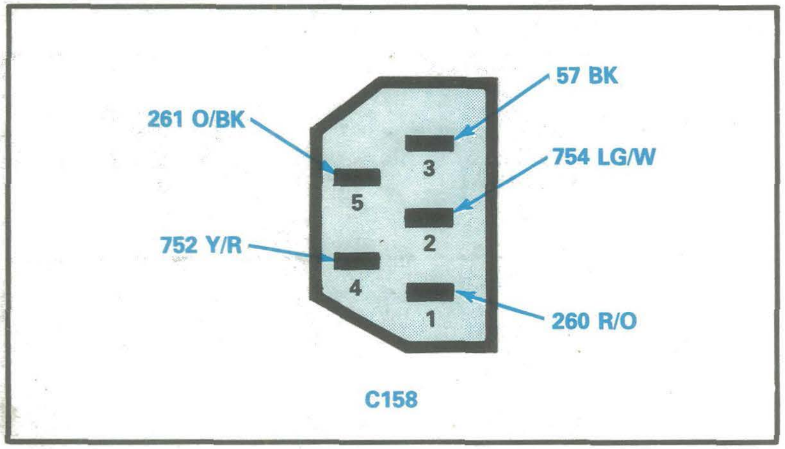
TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Control to These Positions	A Good Switch Will Indicate
A/C Clutch Circuit	181 BR/O *and* 348 LG/P	**Off** **On**	Open Circuit Closed Circuit

SCHEMATIC



COMPONENT TESTING: BLOWER SWITCH

TERMINAL LOCATIONS ON SWITCH



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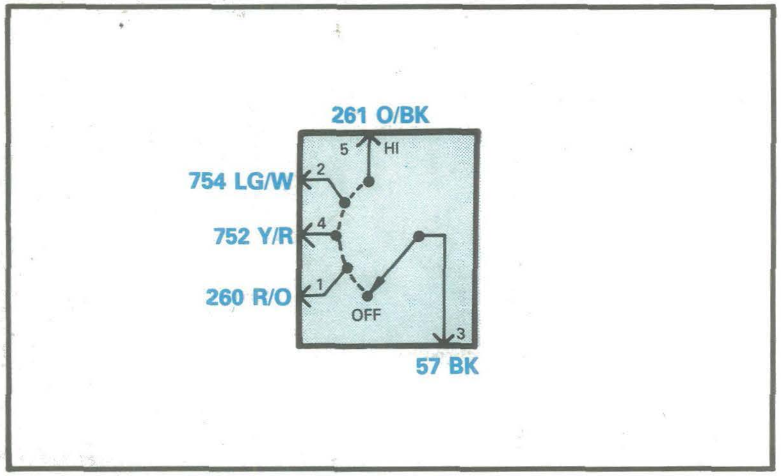

COMPONENT TESTING PROCEDURE

TO TEST	Connect Self-Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Medium-Lo Speed	57 BK (3) *and* 752 Y/R (4)	Lo	Open Circuit
		Medium-1	Closed Circuit
		Medium-2	Open Circuit
		Hi	Open Circuit
Low Speed	57 BK (3) *and* 260 R/O (1)	Lo	Closed Circuit
		Medium-1	Open Circuit
		Medium-2	Open Circuit
		Hi	Open Circuit
Medium-High Speed (M2)	57 BK (3) *and* 754 LG/W (2)	Lo	Open Circuit
		Medium-1	Open Circuit
		Medium-2	Closed Circuit
		Hi	Open Circuit
Hi Speed	57 BK (3) *and* 261 O/BK (5)	Lo	Open Circuit
		Medium-1	Open Circuit
		Medium-2	Open Circuit
		Hi	Closed Circuit
Off	57 BK (3) *and* all others	Lo	Open Circuit
		Medium-1	Open Circuit
		Medium-2	Open Circuit
		Hi	Open Circuit

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